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QUEENSLAND AGRICULTURAL JOURNAL

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Agriculture.

OIL SEEDS WHICH CAN BE PROFITABLY GROWN IN QUEENSLAND.

COTTON SEED.

The cotton plant, almost needless to say, thrives admirably in all parts of Queensland, except on the high lands of the Main Range, where heavy frosts occur, and even in districts subject to light frosts during the months of June, July, and August, cotton may safely be grown if sown from about the end of August to the end of October. In Central and Northern Queensland there is little to be apprehended from frosts, especially on the coast lands. When the crop has been harvested and ginned, there remains the oil-containing seed. Generally speaking, 600 lb. of cotton seed (the produce of one acre) will yield about 12 gallons of crude oil, saleable within the State at 3s. per gallon. Mr. Joseph Campbell, late Director of Cotton Culture to G.P.E., Ltd., Cairns, North

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ERNEST WICKHAM,
Manager for Queensland.

Queensland, in a letter to the "Brisbane Courier" of 24th May, 1916, makes the following statement giving his practical experience of the production of cotton lint, cotton seed, cotton seed oil, and oil-cake on the company's "Caravonica" plantation, near Cairns:—

"As one of the active workers in the cotton industry in North Queensland, especially in the variety known as Caravonica, I take this opportunity of saying that the industry is one of several affording light and lucrative employment for our (returning soldier) boys; and every effort should be made to encourage them to take it up. A good sandy loam—just such land as we have hundreds of thousands of acres of—not too far inland, will yield 1,000 lb. boll cotton per acre, of which 33 per cent. to 40 per cent. is lint (or ginned cotton), my last sales in Liverpool fetching 9½d. per lb. The 60 per cent. of seed is prepared and crushed for oil and oil-cake. My extraction with a hydraulic press of 500 lb. to square inch gives 30 gallons of crude oil per ton, which Kitchen and Son purchase at 3s. per gallon (equal to £33 12s. per ton reckoning 224 gallons of oil to the ton), and the oil-cake fetches £10 per ton. During the drought the price was higher, viz., £12 wholesale and £15 retail. From these facts—not theory—any one can determine whether or not it is worth while growing Caravonica cotton on the seaboard. My contention always has been that this is the crop for our hundreds of miles of waste land, and now that we must rally round and help our boys we shall, by doing so in this way, also develop a very important part of our vast State property, which hitherto has lain waste.

"Cotton growing in conjunction with vanilla—where the lands are contiguous to scrubs—papaws (for making papain)—which do splendidly in the cotton soil referred to—bananas, pines, fibre preparation, green burr, and native plants will offer suitable employment to 500 men to start with in North Queensland, and it will be found that ten times that number will, within a few years, be settled on these lands if a little encouragement is held out to them. Commend the matter to all sympathetic patriots."

During 1916, the price of cotton seed in Europe jumped to £13 per ton, and the oil was quoted at £46 5s. per ton.

The cultivation and after treatment of the cotton crop are simple operations which any able-bodied, willing man can soon master. The crop presents none of the difficulties such as have to be overcome by fruit-growers, sugar-growers, dairy farmers, &c.

We are constantly met by the question: "Whence is the labour to come in the picking season?" This is only a bug-bear to those who have never grown cotton in either the United States or Queensland. Take the cotton-growing districts of the former country. There picking by hand costs 1 dollar 10 cents per 100 lb., or about ½d. per lb. That is the cost also in Queensland with hired labour. An average picker can pick between 200 and 250 lb. of seed cotton in a day, although fast pickers often get as much as 400 to 500 lb. a day. Only white labour is employed, and if in isolated cases any coloured men are employed, they are paid at the same rate as white men. He must be a poor hand who cannot pick 40 lb. of cotton in an hour in the height of the season, thus earning 1s. 8d. per hour. Again, the work is not so laborious that it cannot be undertaken by very young people, many of whom the writer used to employ in the boom times of cotton-growing in Queensland, and whose day's pay often amounted to as much as 10s. to 12s.

In a letter received in 1915 from Mr. E. E. Wood, a well-known cotton-grower and ginnery owner in Texas. U.S.A., who in May, 1914, visited Queensland, he gave reports of cotton-picking in Texas by young people.

Following are some instances:--

"Reports of good picking by the boys and girls are coming in right along. Dennis Sherrell, the eleven-year-old son of D. W. Sherrell, picked 350 lb. of cotton in one day. Claudie Searlet, a ten-year-old girl, picked in Garden Valley 506 lb. This little girl only weighed 67 lb. herself. Pickers in our States are paid ½d. per lb. At this rate a family of four pickers like Miss Searlet could earn £4 6s. per day, whilst eleven-year-old Sherrell would add 14s. 7d. per day to the family income."

It might be said: What about the school attendance of the boys and girls? This matter arose in the sixties by the then Board of Education which so arranged the school work that the usual school summer and early winter holidays were altered to the cotton-picking season, but the schools were kept going up to the regulation time for those children who were not engaged in cotton work, and for those who worked half-time at the business. Cotton-picking does thus not encroach on the children's education.

Now, if this matter of the cost of cotton-picking can be realised by farmers who can devote a few acres to a crop so easily grown, harvested, and marketed, there is no reason why Queensland, with its tens of thousands of acres, or, it is no exaggeration to say, hundreds of thousands of acres, coastal and inland, should not in time become one of the greatest cotton-producing countries in the world. The terrible pests of the United States, the weevil, the cotton-stainer, the boll worm, the leaf worm, have not made their appearance in this State, thanks to the careful measures adopted by the Agricultural Department, with the exception of the boll worm, which is really the maize cob worm, but this is easily controlled by means of top crops of maize. Cotton has the fewest enemies of all our staple crops.

But this is all by the way. What we wished to show was and is that a big trade in cotton seed oil and cotton cake is knocking at our doors, and now is the time to take advantage of the opportunity. Read the following article on "King Cotton." Reliable consular reports state that there is a market in Chile (S. America) for 100,000 lb. per month of cotton seed oil for edible purposes.

KING COTTON'S INDUSTRIAL ARMY.

At the meeting of the American Cotton Manufacturers' Association in Atlanta recently, says "Cotton and Cotton Oil News," one of the speakers said:

"If the cotton produced in this country were manufactured here into as fine a grade of products as is now produced from it in foreign countries, there would be created annually from the lint obtained from the cotton crop a total of 2,155,000,000 dollars instead of 665,000,000 dollars. Taking into consideration the number of persons employed in the 25,000 ginneries, required to gin the cotton from an average crop, the number of persons employed in the cotton seed oil mills, in the cotton seed oil refineries, in the manufacture of cotton goods, and in the production of hosiery and knit goods, as well as in the planting of the crop, its cultivation, care and picking, I am satisfied that there is no other agricultural crop of the world from which such a large number of persons, directly or indirectly, obtain a livelihood."

The industrial army of King Cotton outnumbers the people now in battle array on the bloody fields of Europe, and the industrial armies of King Cotton are engaged in far better work than those of the Kaiser.

SOJA BEAN OIL.

Raw soja bean oil is quoted in the London market and in Hull, England, at £41 per ton, and refined at £45. This legume does well in Queensland, but although the crop pays well in Europe for grain it is a question whether under our Australian labour conditions it would pay as it does in cheap-labour countries. A 1,000 lb. crop at the highest price for the beans would sell in Europe for £4 10s., or perhaps under present war conditions for double or treble that amount, but at present if we had a million pounds of beans it would be a losing game to ship them to Europe, even if ship space were available. So that since there would appear to be little in it to attract the attention of farmers, we do not advocate the cultivation of the soja bean except as a catch crop amongst cocoanut and rubber trees. We append, therefore, only some of the uses of the bean which are (with its products):—For dynamite and high explosives, soap, linoleum, indiarubber substitute, margarine, paints and varnishes in place of linseed oil, various edible foods, salad oil, vegetable cooking oil in place of lard, &c., lamp and lubricating oil, artificial milk, cake for feeding cattle, manure, &c.

COTTON-GROWING.

Next spring from August to October will be the cotton-planting season for Southern Queensland, in the North August to November and March and April. The Department of Agriculture and Stock has ordered Uplands cotton-seed to arrive here in time for spring sowing, and farmers who propose to sow cotton during the coming season should make early application for seed, stating what area they propose to plant. The quantity of seed available for individual distribution will depend on the amount of the consignment. Only the very best and most prolific varieties have been ordered, and we would ask farmers throughout the State to note the following paragraphs on cotton-growing published last March in the "Journal of the Jamaica Agricultural Society." The Sea Island cotton mentioned in the above extract thrives admirably in North Queensland, preferably near the coast. In the South it is better to grow Uplands, some varieties of which have yielded 2,000 lb. of seed cotton per acre. The Caravonica, long-staple cotton is also more suited to North Queensland than to Southern districts.

"COTTON.—The war disturbed the cotton market perhaps more than all products we in Jamaica are interested in. Prices fell, there was less demand for cotton goods; woollen goods on the other hand could not be made quick enough by the mills.

"Yet it has to be taken into account that for five years before the war, the world's consumption of cotton goods was actually in excess of the world's crops.

"The result of the downward rush of prices immediately after the outbreak of the war, was the curtailment of planting of cotton. Prices of cotton, however, have recovered; the world (outside of Germany, Austria, and Turkey) at present must have cotton goods; also there is a special demand for gun cotton used with explosives. Whenever the war is over, it is now calculated, there will be a shortage of cotton. We in Jamaica should plant Sea Island cotton where conditions suit, in August, and we shall try to supply good seed then.

"After the war, cotton must be grown within the Empire, and we here are in the position to help the British Fine Cotton Spinners' Association, by growing Sea Island cotton which, carefully treated, always sells at a good price. This market is a special one, and our conditions suit the growth of the finest of all cottons—Sea Island.

"From 15th August to 15th September is the best planting season. Make ready to plant then.

"We have not much faith in any other cotton for Jamaica than Sea Island, although we should be glad to see any kind grown rather than none at all, as we need such an industry; and as the coarser cotton called Cauto is being grown also, those planting either kind should do so *only* from selected seed, guaranteed pure, otherwise there will be danger of a nondescript cotton being grown. This might not matter for Cauto cotton, but it would be ruinous for cotton intended for Sea Island.

"Prices for Sea Island cotton at present are high, the quotations being 1s. 3d. to 2s. per lb."

The Department of Agriculture and Stock, Queensland, has republished a pamphlet which gives full directions as to the treatment of a cotton crop from start to finish. All growers are offered 1¾d. per lb. for their seed cotton, which will be ginned, baled, and marketed, and any profit over and above the cost of preparing and marketing will be distributed to growers on receipt of account sales.

THE LATEST COTTON-PICKING MACHINE.

The Angus Campbell (or later, Price-Campbell cotton-picking machine) was first noticed in the Journal in August, 1911, and subsequently a demonstration of the work of the machine was given in London in 1914, and the Queensland Executive Engineer reported on this trial which he witnessed, stating that he was satisfied that it could discriminate between ripe and unripe cotton-bolls, finger over the delicate plant, get the lint, and leave the rest unharmed. Strange to say, although Mr. Price's assistant, who was conducting the experiment, assured the Engineer that he would supply him with export prices in the course of a few days, the former went gadding back to the United States. Later on, a letter was received from New York, by the Engineer, signed by Mr. Price, in which he stated that "he regretted to report that he was not yet in a position to name an export price on the machines, or to offer them for shipment abroad, as the inventors had all they could do to meet the American demand." Thus although apparently the machine does all that is claimed for it, cotton-growers outside the United States will not be afforded an opportunity of purchasing one.

In Queensland, Mr. Daniel Jones has invented a cotton-picking machine which, from hearsay, we understand acts very efficiently. We hope this is so and that Mr. Jones' machine will come to the front and relieve Queensland cotton-growers of the necessity for depending on selfish outside manufacturers.

HUMOGEN.

In the February issue of this Journal we made reference to the reported discovery by Professor W. B. Bottomley of the not possible but certain promotion of plant growth by inoculating the soil with a culture of bacteria obtained from the root nodules of leguminous plants, under the name of Humogen, and we ventured to suggest that this discovery was on a par with that of Colonel Halford Thompson, F.R.H.S., of Teignmouth, England, which resulted in the invention of Jadoo fibre, which was some years ago imported into Queensland by Mr. Thos. Wood, nurseryman, George street, Brisbane.

In the April (1916) issue of the "Mark Lane Express" a paragraph appeared as follows under the caption

THE VALUE OF HUMOGEN.

"Humogen is the name given to the preparation of bacterised peat invented by Professor Bottomley, and such glowing accounts have been given of the fertilising value of the substance that much attention has been drawn to it. Perhaps it is a pity that the preparation should have been so 'boomed,' because the effect has been to raise among some people great expectations, and if those sanguine hopes are not fully realised, a reaction will set in, and the possible value of the substance may not be fairly estimated.

"During this season it will be on its trial, and we hope the verdict at harvest time will be in its favour. If so, a new home industry of economic importance will be opened up, and agriculturists will have the benefit to be derived from a cheap and powerful fertiliser.

"At present it does not seem possible to express a definite opinion as to its value. A recent report on the subject from the Midland Agricultural and Dairy College is certainly not encouraging. According to this report bacterised peat is sent out in two forms, viz.:—(1) As a fibrous material for incorporating with the soil, and (2) as a powder for top dressing.

"The powder was applied as a top dressing to wheat and 'seeds' hay at the rate of 7 cwt. per acre, but produced no result whatever on either crop.

"The fibre was tested with potatoes, 5 cwt. per acre being used. The results were again entirely negative."

The "Mark Lane Express" appears to be still doubtful of the value of the bacterised peat. To settle the question, it would be worth the while of our Queensland nurserymen to do as did Mr. Wood in past years, *i.e.*, import some of the material and of the liquid, put it to the proof, and let the public interested in agriculture and gardening know either its value or its uselessness

THE PATRIOTIC ACRE SCHEME IN CANADA.

For the purpose of contributing grain supplies to Great Britain and the allies, the Saskatchewan Grain Growers' Association hit upon a splendid idea, which apparently has proved a wonderful success. Mr. S. W. Yates, a member of the association, gives the following account of "The Patriotic Acre Scheme" and its results in the issue of the "Agricultural Gazette" of Canada for March, 1916:—

"The Patriotic Acre Scheme of the Saskatchewan Grain Growers' Association is undoubtedly one of the biggest things ever carried through by the farmers of the West, and is attracting attention not only throughout this vast continent, but also in the motherland for which this great gift is intended. It is indeed one of the finest expressions of loyalty that one can conceive, being as it is an absolutely voluntary gift, in many cases by men who for the last year or two have suffered heavy losses by drought, hail, and other natural causes, and who had thus a legitimate excuse, had they cared to seek it, for declining to carry out their promises. To their honour, however, many of these men have not only given their acre, but they have even given more than their acre has yielded, in order to be even with their more fortunate neighbours.

"The idea originated with Mr. T. M. Morgan, a director of the association, who communicated it to Mr. J. B. Musselman, central secretary of the Saskatchewan Grain Growers' Association, by whom it was brought to the notice of the executive; meeting with their approval, it was brought before the delegates at the annual convention at Regina in February, 1915, and was adopted with the greatest enthusiasm.

"For the better carrying out of the scheme, a form was drafted, of which 30,000 copies were printed, each in duplicate, and these were sent out in large numbers to local associations in all parts of the province. These forms bear the union jack and ensign in colours with the emblem of the association—a wheat sheaf in the centre, surrounded by the words, 'Saskatchewan Grain Growers' Association.'

"The form of pledge ultimately adopted was drafted with the greatest care, it being distinctly stated that the form is not a promissory note, so that no farmer need fear any form of compulsion being applied in case circumstances render it impossible to carry out his pledge.

"Many interesting features have been brought to light as these forms have been returned to the central office. The nationalities of the contributors, for instance, are most varied, forms having been signed by Englishmen, Americans, Scandinavians, Russians, Roumanians, Austrians, Frenchmen, Germans, and others, and in this connection it may be stated that from one district there came forty forms all of which, with one exception, were signed by natives of Eastern Central Europe, the majority being Austrians. It is also interesting to note that the first actual contribution received was from a German.

"Each farmer, under this scheme, was invited to contribute the proceeds of one or more acres. As a matter of fact, however, each farmer has been left free to make any contribution he desires, and as a consequence, the amounts promised have varied from as low as 50 cents in cash to the product of 10 acres of wheat. The largest contribution is that of Isaac Sterling, of Nashlyn, who contributed 400 bushels of wheat, the product of 10 acres at an average of 40 bushels per acre. The next largest contribution is that of Chas. McCarthy, of Prairie Star local, who gave the produce of 5 acres—viz., 189 bushels, an average of 38 bushels per acre. The largest cash contributor is Wm. A. Kennedy, of Conquest, who sent in a contribution of 154 dollars; the second largest being Clarence Heron, of Ogema, with a contribution of 135 dollars.

"Up to the present time, the actual contributions, as distinct from promises, amount to 56,000 bushels of grain and over 15,000 dollars in cash, which is equivalent to nearly 3,000,000 lb. of flour.

"All wheat contributed to the fund is being handled by the various elevators free of charge, while the milling of the flour will also be done by one of the largest mills in Saskatchewan at practically cost price. The banks are also co-operating by putting through all cheques at par. The flour will be put up in sacks bearing the emblem of the association, and, when milled, will be transported to the coast, it is anticipated, at a minimum cost to the fund.

"The co-operation of the Dominion Government has been secured and Sir Geo. E. Foster, Minister of Trade and Commerce, has guaranteed free transportation across the Atlantic to Great Britain.

"Far as the season has gone, circumstances are such as to make it impossible to forecast with any degree of certainty what will be the total contribution to this great fund. At the present time we are making an effort to get in all forms so as to arrive at the number of acres promised. At the time of writing we have promises of 6,000 acres, nearly one-half of which have been actually redeemed. It is now certain, however, that the result will be one which will bring honour to the farmers of Saskatchewan, and prove to the world that these sons of the soil are doing their duty to the Empire as truly as though they had offered their lives for their country in the trenches of Flanders or Gallipoli."

CORAL SAND IN THE NORTH.

Last March, in response to a request from the Australian Sugar Producers' Association, Limited, that some competent person be instructed by the Minister of Agriculture and Stock to inspect and report upon the deposits of coral sand that are known to exist on the coral islands adjacent to Cairns and Innisfail, the Department asked that as a preliminary a bag of coral sand be obtained and forwarded to the Department for examination and analysis. A sample was accordingly received, and an analysis made by the agricultural chemist, who reported as follows:—

"The sample of coral sand forwarded was in a very fine state of division, and, containing the high percentage of calcium carbonate that it does, would be very suitable for application to soils requiring lime.

Analysis.

Lime	50.40 per cent.
Equivalent to calcium carbonate ..	90.00 per cent.
Insoluble matter	.11 per cent.

MARKET GARDENING.

ASPARAGUS.

It has often been asked why Queensland farmers, who grow in large quantities market garden produce such as cabbage, cauliflower, parsnips, carrots, marrows, &c., whilst they neglect such marketable crops as asparagus, rhubarb, and Jerusalem artichokes. We have frequently given advice as to the cultivation of these latter. Perhaps the following note on Asparagus, from the "Town and Country" Journal, Sydney, may induce some to start growing this vegetable, not as an experiment, for it is well known how it thrives on our coast lands, but on a commercial scale:—

"In normal times of peace, France exports large quantities of tinned and bottled asparagus to Sydney. The Californian preserved asparagus has a good name here. Some of the best samples of this line ever put on Sydney dinner tables have hailed from Geelong, where the secret of attaining an ample length of stick, as well as the head, has been mastered. Asparagus can be well and freely grown in the Botany, La Perouse, Manly, and other saline areas, and elsewhere in New South Wales. All the leading clubs, hotels, and restaurants in Sydney favour asparagus as a regular item of the bill of fare. The sale of preserved asparagus by grocers to private homes in Sydney and suburbs, and in country districts is on the increase. The world's stock has dwindled since the war began. A seedsman of experience can readily put the novice in the way of cultivating asparagus, which is easily raised to perfection in rich well-drained land. Those who have suitable ground for growing asparagus, with a view to canning or bottling, should bear in mind before planting that the ground should be trenched to a depth of 2 ft., at the same time working in a lot of manure, with a generous sprinkling of salt and soot. The seed should be sown in spring. The following winter the plants are transplanted to the prepared bed in rows 18 in. apart, and 9 in. apart in the rows. The plants should be encouraged to make as much grass as possible. They should not be cut for two years, and then sparingly. Asparagus beds properly made bear continuously for twelve to fifteen years. The seed in little lots for private garden use is about 9d. per ounce, 2s. 6d. per quarter-pound. Special terms are allowed to extensive growers in the sandy soils around Sydney and elsewhere, who market the raw asparagus, which is expensive because the quantity grown is not sufficient for the demand. The period to plant out asparagus is from June to September, preferably in July and August, or just as the plants have started to shoot. Usual prices for small lots of strong plants are:—Two years old, 5s. per 100; three years old, 7s. 6d. per 100. A considerable reduction is allowed for 1,000 plants or more. The ground should be got ready before ordering, so that the roots can be put in immediately on arrival."

Our advice to anyone intending to grow asparagus in Queensland is to obtain good strong plants from a nurseryman, plant in June or July, and about the end of October the young shoots will begin to appear. Sowing the seed entails three years waiting for a bed to come into bearing.

A bed of asparagus if the above directions are attended to will bear well for seven or eight years and even longer. Two rows, 30 ft. long will suffice for an ordinary family.

Pastoral.

STOMACH WORMS IN SHEEP.

By W. G. BROWN, Instructor in Sheep and Wool.

In dealing with a small flock of weaners recently, I was surprised to find that another pest to sheep farmers was present, and I would like to ask pastoralists and sheep farmers generally to look out for it.

The history of the case is this: A letter came into the Department from a sheep farmer about three weeks ago, which informed me that, of 100 mixed weaners, about seven months old, over twenty had died. On proceeding to the farm, I could see at once that the sheep showed every sign of worm infestation. To make sure, I had one of the sheep killed which appeared to be moribund. I expected to find either the tape-worm, the ordinary stomach worm (*Strongylus contortus*), or both. To my surprise, neither of these was to be found, but on closer examination I found in the cæcum thousands of worms with the body about the size of a small blowfly maggot, and with a long hair-like attachment which was from half an inch to one and a-half inches long. I knew nothing of it, so I submitted a portion of the bowel to Mr. H. Tryon, of this Department, who informed me that he identified it as the cæcum-worm (*Tricocephalus affinis*), a worm well known in America, but only recorded once in this State.

I used the ordinary drench—arsenic and epsom salts—and on returning a week later to the farm I found that there had been several further deaths. I killed another sheep, and found that the worms were apparently not harmed. On further drenching, however, the flock picked up very well, and to date only one or two others have died, and these were so low when I saw them that I believed they would die.

The rest of the flock were examined by Mr. Adam McGown, M.R.V.C., of this Department, last week, and a post-mortem was held on one which was very low in condition, which was killed. On this occasion the numbers of the worm found were very few, but anæmia and emaciation were the causes of the animal being so poor when it was killed. The rest of the sheep were recovering.

Photographs of this new pest in Queensland will be published, with further remarks, in next month's "Journal of Agriculture."

BASIC SLAG FOR NATURAL PASTURE.

In writing to the "Farmers' Advocate," Bloemfontein, S.A., on farming and stock-feeding in England, Mr. A. de A. Donisthorpe, delegate amongst the "Fifty Farmers' Tour," for the Waterberg and Pietersberg districts of the Transvaal, said—

At Oxford we met Professor Somerville, who gave us some most interesting details of experiments at Cockle Park, the experimental station of Armstrong College, Newcastle, which we also visited later. The idea was to feed natural pasture with manure to increase its sheep-carrying capacity. The substance with which great success was obtained was basic slag. By manuring a 3-acre plot with half a ton of basic slag once only in ten years the ground, which at the beginning could carry only four sheep, at the end could carry ten, thus practically enlarging their farm threefold. Could not something be done in our country to try the effects of basic slag and other manures on our natural grazing to increase its carrying capacity and to encourage suitable grasses and herbage? The effect of the slag was to encourage the clover at the expense of useless weeds.

ANOTHER POSSIBLE SOURCE OF POTASH.

In the "Chemical News and Journal of Physical Science" of the 25th February, 1916 (says "The Indian Trade Journal"), is published an article entitled "Possible Sources of Potash in America," dealing, amongst other things, with the existence of a percentage of water-soluble potash in the flue-dust of cement works. The information therein given may possibly be of interest to cement works in this country. It is said that at least one, if not several, of the cement plants in America are actually recovering and marketing flue-dust containing a relatively high percentage of water-soluble potash. At the abnormally high prices which the product now commands, such flue-dust can, it is stated, be profitably collected and sold to certain consumers of potash salts, as, for instance, manufacturers of liquid soaps.

Mr. H. W. Mobsby, of the Queensland Agricultural Department, who represented Queensland at the late Panama Exposition, took an opportunity to visit several districts round San Francisco where industries were established which might be carried on in this State. Amongst others, he inspected the cement mills at Davenport, California, and there he found the houses, gardens, trees, &c., covered with a fine white dust, and a large area around the works was in a similar condition. This is probably the dust above alluded to.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF MAY, 1916.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Lady Margaret	Ayrshire	14 Oct., 1915	612	5·2	37·59	
Cocoatina ..	Jersey . ..	17 Mar., 1916	478	5·6	31·63	
Lady Melba	Holstein ..	28 Oct., 1915	664	4·0	31·17	
Sweet Meadows	Jersey	28 Sept. ,,	351	7·0	29·19	
Auntie's Lass	Ayrshire .	4 April, 1916	620	4·0	29·11	
Netherton Belle	,, ...	23 April, 1915	476	5·1	28·66	
Pauline ...	Shorthorn ..	17 Sept. ,,	485	4·4	24·96	
Miss Bell ...	Jersey .	2 July ,,	370	5·7	24·95	
Lady Loch II.	Ayrshire . ..	17 Mar., 1916	525	3·9	24·03	
La Huette Hope	Jersey .	17 Nov., 1915	385	5·3	23·98	
Belinda ..	Ayrshire . .	27 Feb., 1916	521	3·9	23·85	
Lady Maid	Shorthorn . .	26 Jan. .	469	4·3	23·73	
Lady Dorset	Ayrshire	10 Aug., 1915	359	5·5	23·35	
Iron Plate ...	Jersey	20 Jan., 1916	393	5·0	23·18	
Mistress Bee	,, .	21 Jan. ,,	391	5·0	23·06	
Twylish's Maid	,, ...	22 Oct., 1915	289	6·7	23·05	
Lady Spec	Ayrshire .. .	6 Jan. 1916	469	4·0	22·03	
Rosine ...	,, ...	17 Aug., 1915	353	5·0	20·83	
Violette Peer's Girl	Jersey	8 Dec. ,,	318	5·4	20·30	

The above cows were fed on natural pasture only.

CHILI WINE.

In answer to a correspondent "Town and Country" gives the following recipe for making Chili Wine:—Take 2 quarts of water, 10 small bruised chilies, quarter oz. of citric acid, 2 tablespoonfuls of white sugar (burn black), 1 teaspoonful essence of lemon, and 3 lb. of sugar. Pour boiling water on the ingredients, colour with the burnt sugar, then when cool bottle and cork well. Another method is to take 1 lb. of brown sugar, 2 quarts of water, 8 small chilies, quarter oz. of citric acid, a teaspoonful of sugar (burnt black), and a teaspoonful of essence of lemon. Pour boiling water on the chilies, acid, and sugar. When cold, mix the burnt sugar to colour the mixture, add the essence, strain when cold, and bottle.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, MAY, 1916.

Three thousand nine hundred and ninety-one eggs were laid during the month. A large number of the birds are in moult. In addition to those mentioned in last month's report, the pens of the following owners are more or less affected:—King and Watson, Padman, Leney (White Leghorns), Gosley, Jarman, Hirst, Holland, Knoblauch, Knowles, Walters, Forrest, and Anderson (White Leghorns). From five to six birds are moulting in the pens owned by Moritz Bros., Leney (two pens), Becker, Pettit, Pocock, Lindus, Hammill, Forrest, and Harveston Poultry Farm. J. Zahl wins the monthly prize, with 132 eggs. The following are the individual records:—

Competitors	Breed	May.	Total.
*T. Fanning	White Leghorns	124	228
*J. Zahl	Do.	132	193
*A. T. Coomber	Do.	122	186
*Mrs. Jobling, N.S.W.	Black Orpingtons	106	170
*Dixie Egg Plant	White Leghorns	115	170
T. B. Hawkins	Do.	81	158
*J. Anderson, Victoria	Red Sussex	71	157
A. Howe, N.S.W.	White Leghorns	90	154
*Kelvin Poultry Farm	Do.	91	142
*Miss M. Hinze	Do.	122	141
G. H. Turner	Do.	88	141
S. B. Tutin	Do.	74	140
W. Lyell	Do.	86	135
Mrs. Munro	Do.	86	130
W. Meneely	Do.	100	130
*E. F. Dennis	Do.	90	128
Mrs. Bradburne, N.S.W.	Do.	50	125
*J. M. Manson	Do.	96	124
Dr. Jennings	Do.	94	123
*E. Walters	Do.	67	123
*E. A. Smith	Do.	73	121
T. E. Jarman, N.S.W.	Do.	58	120
P. Brodie	Do.	57	119
A. H. Padman, S.A.	Do.	52	117
Geo. Tomlinson	Do.	76	112
C. P. Buchanan	Do.	67	109
*J. F. Dalrymple, N.S.W.	Rhode Island Reds	83	107
J. M. Manson	Black Orpingtons	66	105
A. W. Bailey	White Leghorns	71	104
H. Jobling, N.S.W.	Black Orpingtons	49	103
Kelvin Poultry Farm	White Leghorns	73	103
H. W. Broad	Do.	54	99
T. Taylor	Do.	41	96
*J. H. Gill, Victoria	Do.	51	96
*J. H. Madrers, N.S.W.	Rhode Island Reds	50	94
*C. Knoblauch	White Leghorns	52	93
J. Gosley	Do.	64	86
Geo. Prince	Do.	71	85
F. Clayton, N.S.W.	Do.	58	85
*E. West	Do.	59	84
G. W. Holland	Do.	33	81
Mrs. C. Davis	Do.	50	80

EGG-LAYING COMPETITION—*continued.*

Competitors	Breed.	May	Total.
King and Watson, N.S.W.	White Leghorns ...	37	77
A. F. Camkin, N.S.W.	Do.	61	77
*W. L. Forrest, N.S.W	Do.	38	76
G. R. Wilson	Do.	73	76
Mars Poultry Farm	Do.	55	75
*W. H. Knowles, junr.	Do.	45	71
A. T. Coomber	Sicilian Buttercups ...	47	67
T. Fanning	Black Orpingtons ..	49	62
E. Pocock	White Leghorns ...	20	62
W. Hirst, N.S.W.	Do.	29	59
J. Anderson, Victoria	Do.	23	57
W. Purvis, S.A.	Do. ...	48	54
W. Becker...	Do.	23	51
F. Clayton, N.S.W.	Rhode Island Reds .	19	49
W. H. Forsyth, N.S.W.	Black Orpingtons ...	21	49
R. Burns	S. L. Wyandottes ...	39	42
F. W. Leney	Rhode Island Reds ...	20	39
R. Burns	Black Orpingtons ...	29	39
Cowan Bros., N.S.W.	Do	19	38
W. Lindus, N.S.W.	White Leghorns ...	0	31
*J. W. Macrae	Black Orpingtons	33	33
J. J. Richter	White Leghorns ...	22	28
H. Hammill	Do.	0	25
F. W. Leney	Do. ...	2	25
L. K. Pettit, N.S.W.	Do.	14	25
Cowan Bros., N.S.W.	Do.	23	23
Harveston Poultry Farm ...	Do. . .	0	18
Moritz Bros., S.A.	Do.	0	5
Mars Poultry Farm	Black Orpingtons ...	0	3
E. F. Dennis	Do.	3	3
E. F. Dennis	White Wyandottes .	0	0
Totals		3.991	6.539

Pens marked * are engaged in single hen test

RETURNS FROM SINGLE HEN TEST PENS FOR TWO MONTHS.

Competitors.	A.	B.	C	D	E.	F.	Total
T. Fanning	45	15	43	38	32	25	228
J. Zahl	35	30	35	32	31	30	193
A. T. Coomber	35	38	28	32	19	34	186
Dixie Egg Plant	44	40	29	24	0	33	170
Mrs. Jobling	44	49	9	32	12	24	170
J. Anderson	38	19	31	0	39	30	157
Kelvin Poultry Farm	19	15	35	17	35	21	142
Miss Hinze	26	12	40	21	21	21	141
E. F. Dennis	22	31	4	35	18	18	128
J. M. Manson	0	47	22	11	30	14	124
A. E. Walters	13	43	9	19	28	11	123
E. A. Smith	31	1	10	39	24	16	121
J. F. Dalrymple	27	6	29	0	20	23	107
J. H. Gill	3	40	5	37	1	10	96
J. H. Madrers	0	8	32	31	22	1	94
C. Knoblauch	23	7	6	19	16	22	93
E. West	28	17	0	1	0	38	84
W. L. Forrest	10	18	18	24	6	0	76
W. H. Knowles	33	7	12	3	6	10	71
J. W. Macrae	0	18	15	0	0	0	33

The Horse.

WHERE ARE THE HORSES?

By COLONEL RICARDO (England).

I do not know whether many people will take the trouble to read this short article, but if they do I must ask their pardon for possibly giving them only a repetition of a subject on which I have written for the past two years. The main point in both the two former articles centred round the future of the horse, and that is certainly a subject which ought to interest Englishmen. It has been for centuries our proud boast that we are a horse-loving nation, we have for years produced all that is best in all our breeds, we send our choicest sires to our colonies, and also to countries not owned by us. We have bred the finest blood stock the world has ever seen, we breed sires that are known all over the world, our polo ponies are eagerly snapped up by the Americans; but soon, according to the report, we shall cease to own a horse at all. The Government is far too busy just now to waste any thought on the coming shortage; but, undoubtedly unless some law is passed speedily, we shall be going hat in hand to foreigners after the war to try to get back our lost superiority. The law that should be passed at once without another moment's delay is one to prevent the exportation of another mare out of England. Once get this passed, the breeders must then turn to and do their best. There were a good number of mares sent back from the front last year; these should have been given (not hired) to the farmer, or breeder, if you like the word better, for his own, provided he put them to a suitable sire. All the vexatious restrictions put on the custodian by the Board of Agriculture which are in force now should be swept away. What matter to the nation if the breeder does occasionally hunt his mare even when in foal? In Ireland they have done this often enough. of course exercising care as to how long to go on. These cast mares from the Army sold at capital prices, but it would have been far more to the credit of the Government if they had made them a nucleus for a State breeding project. As I said before some years ago, we want ten thousand mares imported from somewhere—Argentine, Texas, or the various horse-breeding countries—and to set them apart at once for the purpose of setting up our depleted stock again. I do not mean to say that we are to do all this at once, for it must take time, but "never another mare to be sold out of England" should be the watchword of the day. It is true that the Government point to the different way all war is waged now; the whole of the transport is brought up to the very trenches by motor, and this has made an enormous difference in the work of the A.S.C. Granted that this is the case, granted that henceforward every shell and every biscuit supplied to our men shall be brought up by mechanical transport; can we horse our cavalry with motor cycles? can the Horse Artillery trust to motors to race their guns to the front? No, we must have horses, we must mount our men, so that when called upon they can again ride through the German Uhlans as if they were paper; we *must* have the Horse Artillery, the pride of the English Army; we cannot lightly cast the horse aside. How is it that we have been able to produce any animals at all? Where would our mounted branches have been had it not been for the hunting studs? You can hardly take up a paper but you see a letter from someone imploring us at home to keep hunting going; but how can it be done unless there are a certain number of horses to go on with? The same with racing; the stoppage of this is going to ruin many thousands of men, let alone the breeders. The small men say that they cannot afford to breed now the prices rule so small; the small owner does not think it worth while to keep on his stud when there is no chance of his being able to get his horse in any race. The trainer has had three-quarters of his horses taken away, most of his stable lads, so how can he keep going or carry on? The crowds of people who live by racing, the touts, the very card sellers themselves, the thousand and one men who earn a precarious livelihood by something connected with the horse—all will have to go. Is there no far-seeing statesman who can look ahead a bit and foresee this and do his best to supply a remedy? Rumour states that a large quantity of the horses of the gallant yeomen who so worthily kept their end up in Gallipoli have been sold in Egypt for a song, to save the cost of bringing them home. The mares of this force might easily have been spared and brought home. No remount department appears strong enough to even suggest this to the powers that be; but surely it would be a sound undertaking? When the war is over, men will want to come back and hunt, the whole of the Army will want remounting. They have been wise enough these last few months in getting an enormous stock of mules into the country, and these most useful animals will save the horses a lot; but even the most sanguine statesmen cannot contemplate mounting the Army on mules, nor can the hunting man hope to hold his own on a quick thing on a mule. Horses will have to be got, and the sooner we puzzle out the way to get them the better. The authorities are not going the right way to keep what few horses they have in good health; here in the beginning of November we have them out in the open. The police tell me that an order has hurriedly come through, telling them to look out for billets for them for the winter. One would have thought after the experience of last winter, when the Yeomanry horses went down like flies, that some precautions would have been taken. Certainly at a number of garrison towns open sheds have been constructed: this is all as it should be, but there is not enough of them. Let us all, however, try our best to make up for the mistakes of others; let us "carry on" whenever possible; do not let our enemies ever have the chance of saying that they have frightened us into leaving off hunting and racing; do not give them a chance to say that we have knocked off breeding because we think it is not required; never let it be said that we were terrorised in our sports. But let us few who are left in England, who are too old for Lord Derby and his men, try to help towards what ought to be one of the first things to do, to take care that the English racehorse, the English hunter, the horses we love and whom we have hitherto been so proud of, do not die out altogether.—"Farm Bulletin," June.

The Orchard.

A HINT TO FRUITGROWERS.

ORCHARDISTS MAKING JAM.

The main object of an extensive fruitgrower is to run his orchard at a profit. Many orchardists have had the experience, on occasion, of marketing fruit in Sydney and elsewhere at a loss. In other words, after paying freight, and other expenses incidental to getting the fruit to market—including the agent's commission—the fruitgrower has found himself out of pocket on the transaction; and this is without reckoning time or labour in gathering, grading, and packing the fruit for market. Such experiences have set the orchardists thinking. They do not blame the agents. These monetary losses have resulted from a glut, an unsaleable surplus of fruit of a perishable nature, that cannot be held over from day to day.

Among those orchardists who have pondered over the problem is Mr. H. H. Smith, of Jerseyville Orchard, Seven Hills. He has made a profit of £3 18s. on 90 lb. of fruit turned into jam on the orchard premises, a striking contrast to a direct loss accruing from the marketing of raw fruit, or to a paltry 1s. or so per case, as the credit balance after paying for cases, commission, &c. Several months ago Mr. Smith established a jam factory on his orchard, beginning with a capacity of a cwt. of jam at a time, the appliances including a one-horse boiler and a 12-gallon copper. He also has a preserver, in which 2 lb. cans (with the fruit whole, in syrup) are dipped three dozen in each operation. The lids are crimped, so that no soldering is required. The machinery is sheltered in a commodious shed. Screwlids are in many instances found preferable to prepared parchment as a covering for glass jam jars. The varieties of fruit so far requisitioned for the new industry include peaches, apples, apricots, pears, and plums. Mr. Smith has further succeeded in the make of plum sauce, readily saleable. He is about to extend his plant, and proposes to buy fruit extensively from orchardists in his neighbourhood.—"Town and Country."

A MAIZE-CUM-POTATO CROP.

The "Farmers' Advocate," Bloemfontein, S.A., records that an American farmer is doing a good deal of maize-potato planting. The two combine splendidly. One secures almost as much maize to the acre as though it were planted to it alone, and the potatoes are an extra crop. In following this method the rows of potatoes and maize should alternate 40 in. apart, and the maize should be 8 in. apart in the row. This method secures plenty of air and direct sunshine upon the maize crop.

Viticulture.

GRAPE CULTURE EXPERIMENT—BUDERIM MOUNTAIN STATE SCHOOL.

Local growers hitherto have planted Isabella grapes for their own use. These have not proved very satisfactory for several reasons—(1) Uneven ripening of fruit on individual bunches; (2) ripening takes place late—during our wet season—and the excessive moisture causes bursting of fruit.

Objects of Experiment.—It was thought that these disadvantages could be overcome by planting other varieties which would—(1) ripen earlier; (2) produce looser bunches, allowing room for expansion of fruit.

After consultation with fruit experts, two grafted plants of each of six varieties (likely to meet requirements) were planted on the school experimental plot in October, 1915. The ground was trenched to a depth of 2 ft. 6 in., and loose stones put in the bottom of the trench for drainage. Well-decayed farmyard manure was added to the top soil.

A comparison of the first season's growth of the different varieties as shown below is interesting, although, of course, we must wait for the production of fruit to obtain full results from this experiment:—

Variety.	Length of Canes.		Total
Snow's Muscat ..	No. 1.	2½ inches..	2½ inches
	No. 2.	1 foot	1 foot
Goetha .. .	No. 1.	4 canes—9 feet, 3⅓ feet, 4 feet, 4 feet .	20⅓ feet
	No. 2.	5 canes—5 feet, 4 feet, 4 feet, 4 feet, 4 feet	21 feet
Chasselas	No. 1.	2 canes—2 feet, 1 foot 6 inches . ..	3½ feet
	No. 2.	Scion died	Nil
*Wilder .	No. 1.	4 canes—18 feet, 1½ foot, 2 feet, 2 feet ..	23½ feet
	No. 2.	2 canes—10 feet, 4 feet .. .	14 foot
Iona . ..	No. 1.	2 canes—5 feet, 4 feet.. ..	9 feet
	No. 2.	3 canes—2½ feet, 5 feet, 7 feet .	14½ feet
Syrian	No. 1.	2 canes—1¾ foot, 4 feet	5¾ feet
	No. 2.	1 cane—5 feet	5 feet

* No. 2 Wilder was planted at end of trench.

[We have frequently been indebted to Mr. R. G. Bartlett, headmaster of the State school, Buderim Mountain, for very interesting accounts of experiments made in fruitgrowing at the school grounds. These experiments are not made haphazard, but with judgment, aided by the officers of the Department of Agriculture and Stock, and are carried out on scientific lines. The above notes on "Grape Culture Experiments" are valuable aid to local viticulturists, and it is to be hoped that when the fruit ripens Mr. Bartlett will give us a full account of the results.—Ed. "Q.A.J."]

Tropical Industries.

THE LATEST COTTON-PICKING MACHINE.

In the June number of this Journal for 1911 we gave some account, with illustrations, of the Angus Campbell cotton-picking machine, which has taken twenty-five years to bring to the state of perfection at which—according to the undoubted testimony of such men as Herbert E. Walmsley,' then president of the New England Spinners' Association; Arthur Hammerslag, of the Carnegie Technical Schools of Pittsburgh; Percy Freeman, the Dallas agent of Alexander Eccles and Co., the English cotton-buying house—it has triumphantly arrived. After seeing it at work in the field, Mr. Walmsley, who attended the final trial as a sceptic, came away thoroughly convinced that, at last, a perfect machine had been evolved. He said: "After having seen the machine in operation, after having seen the actual results accomplished by this particular cotton-picker, and after carefully and thoughtfully studying the matter. . . . . I am convinced the machine must and will rank in the future with such inventions as the gin, the sewing-machine, or the drawing and spinning frame. The rapidity, the ease, and the self-evident perfection with which the machine does the work were to me a revelation, and must, in my judgment, prove to be a revolution in cotton-picking."

Mr. Freeman, above mentioned, who is not a demonstrative person, pronounced it a success. He had counted stalk after stalk with 14 or 15 opened bolls, and every one was picked. He then wrote to his firm in Liverpool, and they, in turn, cabled that they would like to become interested in the machine.

In the words of a writer in "The World's Work," December, 1910:—"The death knell of the annual cotton-picking upheaval in the South has been sounded. . . . . The average field hand can pick between 200 and 250 lb. of seed cotton a day, although fast pickers often get as much as 400 or 500 lb. The machine can cover 8 or 10 acres a day. In a good field it would pick 8,000 or 10,000 lb., and in a poorer field 4,000 to 5,000 lb. With it, a man could go over a 40-acre farm twice in ten days, and picking time would be the least busy time of the year."

The machine itself is a small, gasoline, traction engine, with two picking attachments swung under it and a pair of canvas bags hung out behind. It travels through the field as fast as a man walks, taking the cotton plant between the wheels, where it is picked over by almost countless steel fingers which catch the lint, but leave the plant uninjured, so that the later bolls may mature. Here it is that the machine triumphs. Not an unburst boll is damaged. To leave the unripe bolls has, until now, been the great difficulty in making a mechanical cotton-picker. Cotton cannot be gathered all at once, like wheat. Cotton bolls on the same plant mature and open progressively, making the problem of mechanically picking cotton extremely difficult.

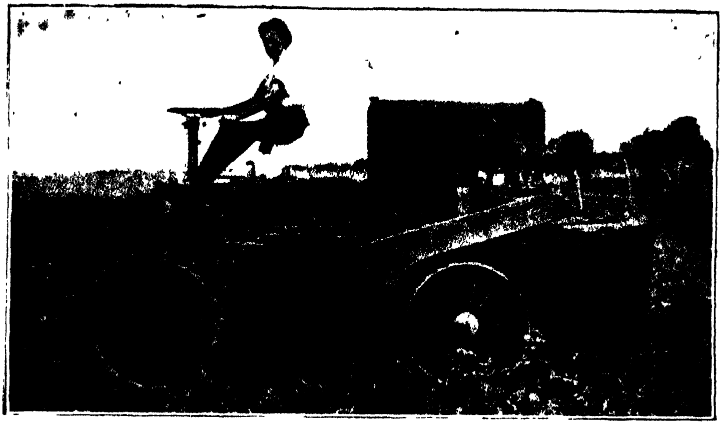

PLATE NO. 1.—THE MODERN COTTON-PICKER IN OPERATION.

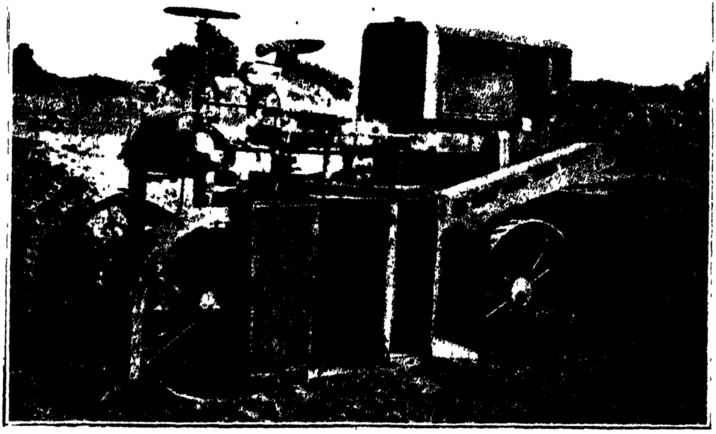

PLATE NO. 2.—COTTON-PICKER WITH CASING OPENED TO SHOW THE MECHANISM.

A cotton-picking machine to be commercially successful must be able to pick the open bolls without injury to the unopened bolls and blooms or to the foliage and the plant itself. It must do this faster and at a lower cost than can be done by hand, and it must be able automatically and mechanically to discriminate between the ripe and unripe bolls.

Further. as the cotton is not all ripe and open at the same time, it must be able to go over the same field and plants two or three times during the season without injury to plants or bolls. At one of the demonstrations in Texas, a farmer followed it for a while, and then stopped still in the row and indulged in every ejaculation of surprise of which he was capable, profane and otherwise, winding up with: —

PLATE No. 3 —COTTON-PICKER MOVING BETWEEN THE ROWS.

"Why, that thing looks like it was made to make sausage out of a live hog, and it's been over half a row of cotton and ain't hurt a plant."

THE PICKER A MONEY SAVER.

Still quoting the "World's Work," we are told that the machine will save the cotton farmer's money and temper. It will pick his cotton more cheaply than the hand pickers do, and it will not have to be begged to do so. Let us take, for example, a 100-acre farm producing half a bale to the acre. The machine can cover at least 8 acres a day. Its expenses would be approximately—

Wages in America.

Driver	£0	6	3
Gasoline and oil	0	10	5
Boy	0	4	2
Repairs	0	4	2
Per day	£1	5	0

At that rate it would cost £15 to go over the farm once with the machine, and £30 to pick the 100 acres twice, which it could do in 25 days. To pick the 50 bales from this 100 acres by hand would cost between £100 and £160; and it would take more than twelve hands to complete the task.

From the saving of from £70 to £130 must be deducted the interest on and depreciation of the machine.

The mechanical cotton-picker is arranged so that the machinery can be taken off, and a plough, planter, harrow, or any other farm implement hitched to the 29-h.p. tractor. The price of the machine is £1,000.

HOW THE MACHINE WOULD AFFECT QUEENSLAND.

Now that there is some prospect of a forward movement in cotton-growing in Queensland, we may point out in what manner this successful machine would benefit the industry in this State. First of all, the cost of the machine has to be considered. At present the price is £1,000. There are, so far, no growers in Queensland who could afford to purchase such a machine; but, reasoning by analogy, there are no farmer growers of sugar-cane who could afford to pay £10,000 to £40,000 for a sugar-mill; yet we find in all our sugar-growing districts men growing from 10 to 50 acres of cane who make the industry pay them handsomely by means of the central or privately owned sugar-imlls. The present cotton-growers own no cotton gins, neither did they in the palmy days of cotton-growing in Queensland; yet the small grower found it paid him to grow from 5 to 50 acres of cotton, because he could either sell it to the ginowners or have it ginned at a reasonable rate. What applies to the sugar-mill and the cotton-ginnery will apply with equal force to the cotton-picker.

It may also be cited, as an instance of the employment of expensive machinery, that, although individual wheatgrowers may not be able to purchase their own threshing machines, not cultivating vast areas of wheat, yet they derive a certain amount of profit by growing small areas and having it threshed by owners of threshing machinery. The growers in a cotton district could either combine to purchase a picker, or a capitalist could, on the assurance of a certain area being laid down in cotton, be induced to purchase a machine and pick all the cotton in the district.

The main question to be answered is—Would it pay the grower to have his cotton picked by the machine, and would it pay the machine-owner to pick it at such a price as would enable the grower to realise a good profit from his crop?

As we took a 100-acre farm and a half bale (200 lb. lint, equal to 600 lb. seed-cotton) crop as an example of the cost of picking the crop by machinery, we will consider the same area as being picked by hand. In twice picking by the former method, the cost is set down at £30 to pick 600 lb. seed cotton per acre on 100 acres; that is to say, that 60,000 lb. of cotton are picked for £30. By hand, the cost of picking in the United States is 1 dollar 10 cents per 100 lb., or about ½d. per lb. This is the price paid in Queensland. Hence 60,000 lb. would cost £125 to pick by hand, as against £30 by machine, not to speak of the vast saving of time and labour. The cotton-grower within reach of a machine would have nothing to do with this crop at picking time, and would, therefore, be at liberty to attend to other work, which, under the hand-picking system, would have to be neglected or additional labour would have to be employed. The capabilities of cotton-growing in Queensland are enormous, and the advent of this machine should prove an incentive to farmers all over the cotton districts to plant as many acres of cotton as possible, with a view to making the State what it can easily become—the greatest cotton-growing country in the world without employing a single coloured labourer.

SUGAR PROSPECTS IN THE NORTH.

LOWER BURDEKIN DISTRICT.

The General Superintendent of Sugar Experiment Stations has received from the Field Assistant to the Bureau (Mr. A. P. Gibson) the following report:—

Since my last inspection, beneficial rains have been precipitated upon this district, registering for the past three months in parts up to 26 inches, consequently quite a transformation was noted. The apparent barren surface soil once again has become carpeted by dense vegetation. The water-courses and lagoons, although far from being full, contain adequate supplies. Owing to the prolonged adverse conditions during the season 1915, it was not found possible to prepare the land for planting until softened firstly by the application of water, which operation naturally was found most costly; fortunately the rainfall of recent date fell in sufficient quantities, thereby obviating the necessary methods practised last year of watering previous to cultivating. Much activity prevailed upon the many holdings, and the turning over of extensive areas by double disc and oil tractor ploughs was proceeding apace. In a few instances settlers did not avail themselves of the favourable opportunities to break the soil of their cleared areas, thus delaying planting. Such virgin lands should be broken and frequently stirred for their betterment for a period of not less than three months previous to planting.

Climatic conditions at present for planting are most favourable. Sufficient moisture exists for the satisfactory germination of seed, and it is anticipated, should further beneficial rains fall, the crop for 1917 could be an exceptionally good one.

Where planting was being continued the soil was noted to be in fair condition. The cane drills were being run out at 5 feet centres, and the principal varieties being planted were 24B and H.Q.426.

The cane in use appeared satisfactory. Unfortunately much unavoidable waste resulted, due to the stem possessing so much immature top. The seed was being deposited by crop planter into the drills at distances varying from 5 to 8 inches, and utilising probably some 27 cwt. of plants per acre.

Relating to the husbandry of plant cane besides the use of disc and scarifier cultivators, it is customary to subsoil a part or the whole of the land existing between cane rows. This operation, especially where the cane has already stooled, requires much consideration, and when performed during periods of dryness seriously retards all growth, owing to the supply of food suddenly being cut off by the severing of the nutrifying roots.

Until quite recently intense irrigation has been practised. The 1916 crop, comparatively speaking, was raised by it, consequently meagre profits are anticipated. However, without it, caneraising in these parts seems but a gamble. Some paddocks of cane have received as many as seven waterings, but the average may be put down at four, costing approximately per application per acre from 30s. to £2. The area watered per day is dependent principally upon the levelness of ground and composition of sub-strata. Previous to the falling of rain this year the subterranean supply in places subsided as much as 7 feet, but has risen to its customary level now.

The spray system of irrigation has been given a trial upon the well-known property possessed by Mr. Clark. The water is sucked up from an adjacent lagoon by a centrifugal pump, belt driven from an oil tractor engine, and forced through a 6-inch main composed of 20 gauge galvanised iron, and containing, every 35 feet, two 4-inch valves on opposite sides, so that portable pipes possessing sprayers at 17 feet 6 inches spaces may be attached. Two branches are necessary, for when one is in operation, the other may be transported into the desired position. This system is yet in the experiment stages, so no authentic information is available. However, I consider the system beneficial for the irrigation of canes in the smaller stages.

Fertilisers are not extensively applied here; the only one used is meat-works, at the rate of 6 cwt. per acre, and lime by way of experiments, with marked results. Where intense irrigation is practised it is considered most essential that manures should be applied, especially so where the waters are derived from subterranean sources. These waters percolating through rocks, soils, &c., have the tendency to dissolve ingredients which are partly retained in solution, consequently impoverishing the soil, therefore I maintain it is important that this depletion by leaching, where possible, should be restored by frequent manuring. Green manuring in conjunction with liming and fertilising upon the forest soils of the Lower Burdekin are essential for yielding nitrogen, and materially improving the capacity of the soil for retaining moisture. Corn partly by way of rotation has been grown extensively. Unfortunately, climatic conditions proved detrimental, causing the crop to become severely blighted, resulting in exceptionally poor returns.

The variety of cane known as B.208 has now become so seriously affected by the prevalent top disease that the discarding of it is recommended.

M.1900 and N.G.15 also indicated slight signs of top disease; therefore I would urge the growers to exercise the greatest care in seed selection, otherwise serious losses at some future date must follow. Hoppers in all stages were in evidence, but doing little damage to the growing crops. Strange to relate, the toads, which abound in this locality in uncountable numbers, evidently find the hoppers appetising, and have considerably reduced the population of this pest.

The prospects for the coming season are not flourishing, but present a brighter appearance than did season 1915. Approximately some 145,000 tons for the district are estimated, and Inkerman factory will crush this season, commencing in July, and treating probably some 45,000 tons.

PROSERPINE NOTES.

The above-mentioned sugar district was visited, and my work was much hindered by wetness.

Portions known as Cannon Valley and Saltwater were reported to have received as much as 12 inches of rain, while the precipitation upon the lands surrounding the factory was much less. The crop previous to the rainfall of recent date was reported to be fast perishing, but since has much improved, and at time of visit I considered the crop well advanced and looking remarkably well, especially that raised at Saltwater and adjacent river lands, consequently large tonnages are anticipated, provided that they are harvested before deterioration sets in.

Little work upon the farms was being continued owing to prevailing wetness. The existing cultivation apparently was superior by far to that seen on previous visits, due probably to past dry conditions, permitting cleaning of crops and better tilling.

Small areas of cane have been planted this year, but much remained to be planted, and what had been planted seemed to have germinated satisfactorily.

The varieties of cane here raised are numerous, many of which unfortunately possess a low sucrose content, therefore should be discarded.

The canes seemingly suitable for the district are as follows:—N.G.15, on portions of the river flats, The Gorus, 24B, 24A, 24, and H.Q.426 upon the adjacent river flats.

D1135 and Malagache grow favourably upon most lands, and often produce satisfactory crops on soils where other varieties fail completely. When raised upon fertile soils the Malagache, which really is a ten-months' cane, yields prolific crops of a recumbent nature, and if not harvested and milled at maturity (which generally is about the end of September), quickly deteriorates, thereby resulting in serious losses to grower and miller. If less Malagache were raised and more of the approved varieties grown, increased profits by farmer and miller would be derived.

The variety known as Green Seedling has contracted the top disease, apparently similar to that possessed by the B.208. Yellow stripe was noted upon the leaf blades of H.Q.426 and B.147. This disease, according to investigations made in other parts, was not found infectious, and only spread by the planting of stems containing the disease.

H.Q.5.—The mid-rib of many leaves possessed a ruby red colouration from sheath to the utmost extremities. The same thing was noted on N.G.15 at Herbert river, season 1915.

Leaf hoppers were plentiful, but not causing extensive damage. Grubs in places were troublesome. However, no startling damage has yet been reported.

The prospect for the coming season is not a record, but is most promising. Approximately some 52,000 tons are expected to pass through the rollers, but this tonnage may probably be increased now that beneficial rains have fallen.

COTTON SEED FOR THE 1916 SEASON.

The enormous demand in the United States of America for cotton seed for oil-making purposes has resulted in a shortage of seed for local planting in the cotton-growing States and for export. The Queensland Department of Agriculture and Stock, however, made early arrangements for the purchase of a considerable quantity for distribution to Queensland farmers in time for the coming planting season. The shipments should arrive in time for September planting. Five varieties, so far known in this State, appear from description to be the very best quality of heavy producers, some coming early to maturity, four being long-stapled, and one short-stapled—all Uplands, which kind is most suitable for planting in the Southern, Central, and Western districts.

LONE STAR.

appears to be a very productive variety of long staple. The bolls are very large, being from 1½ to 1¾ inches in diameter and 1¾ to 2 inches in length. They have short, blunt points, and from thirty-five to forty-five go to the pound. The lint is from 1 to 1⅛ inches long, very strong, even fibres, and the percentage is from 38 to 40 of lint per cwt. of seed cotton, which means about 1 bale (400) ginned cotton from a 1,000-lb. crop, or £15 to £20 per acre, besides the seed. A common crop of Lone Star in the States is two bales per acre.

TRICE.

This is a short-stapled cotton, maturing very early. The plant grows from 2 to 5 feet in height. Like Peterkin, to which it bears a great resemblance, it is very prolific. The lint runs from ⅞ to 1 inch in length, and the percentage of lint to seed is from 28 to 35.

COLUMBIA.

Another long-stapled variety of Uplands, of the Russell Big Boll type. The bolls are very large, and the lint is from 1¼ to $1\frac{7}{16}$ inches long, very fine and silky, and uniform; 29 to 33 per cent of the crop is lint. It is of low-growing habit. The lint often has a green tinge, arising from the colour of the fuzz on the seed. This is a very undesirable quality. The true seeds should be white. Any plant producing bolls with a green tinge should be destroyed, as the lint is worthless. But where white seeds only are sown, this variety is well worth planting, being superior both in quality and price to Russell's.

DURANGO.

A new type of long-stapled Uplands, a very early-maturing variety, and suited to a long range of varying climatic conditions. It is earlier than Columbia, and is well adapted to the new system of cotton culture (which we described in this Journal in February, 1916). By this system the vegetative branches are suppressed, and the fruiting branches are increased, hence an earlier and increased crop. The bolls run 60 to the lb. The lint is 1¼ inches long, and the seeds are fuzzy.

HOLDON.

This is a big-bolled type. The lint is longer and the bolls larger than in any other type. The plants grow to a height of from 2 to 4 feet. Bolls short and blunt. Lint fine and silky, from 1⅛ to $1\frac{3}{16}$ inches long, and the yield is from 33⅓ to 35 per cent. of lint. The seed has a dense white fuzz, with a larger percentage of the 5-locked bolls of any other variety.

Such is a short description of the varieties of cotton which the Department has been advised to import, and unless a shortage of shipping, or any casualty due to the war, should occur, there will be ample time in September to sow. Possibly seed of Columbia and Holdon may not be obtainable. We may incidentally mention that last year we sowed cotton in December, and at this time of writing the plants are bearing fine bolls (7th June), and they have not suffered in the least by the frosts of 19th and 20th June.

PERPETUATING GOOD VARIETIES.

Cotton-growers who wish to ensure a continuance of the true types, should bear in mind that unless selection is continued, the value of a variety is sure to decline. Even in the best and the most carefully selected stocks, inferior plants will appear, and if these are allowed to multiply and cross with the others, the stock will surely deteriorate. The pollen from the flowers of these inferior plants is carried about by bees and other insects, and the seeds developed from such pollen transmit the characters of the inferior plants, and even if they do not come into expression in the first generation, they are likely to appear in the second.

To grow cotton from unselected seed involves the same kind of losses as in an orchard planted with unselected, ungrafted apple, citrus, or other orchard fruits

PRESERVATION OF VARIETIES BY SELECTION.

The method of selection to be followed in preserving a variety from deterioration is entirely different from that employed in the development of new varieties. The breeder of new varieties looks for exceptional individuals, and prefers those which are unlike any variety previously known. This is, however, a specialty, and the cotton-grower's business is, not to secure seed from peculiar plants, but to reject all that deviate from the characters of the variety he has grown. Now, to command success in preserving a variety, the first qualification for selection is a familiarity with the habits of growth and other characters of the variety, to enable the farmer to confine his selection to the plants which adhere to the form or type of the variety, and to reject all that vary from that type. How is this done? The first thing to note is the behaviour of a new variety. Do not wait till the crop matures, but watch the plants in the early part of the season. Even before the time of flowering, it is possible to distinguish "freak" plants by differences in their habits of growth, or the character of their stems and leaves. Wherever you find any divergence from the true plant characters, the plants showing them must be pulled out at once in order to prevent the crossing of the good plants with inferior pollen. After the bolls begin to reach a mature size, it is well to go through the field again and pull out all plants that show by the small size or other peculiarity of the bolls, that there had been a variation from the standards of the variety. These field selections will save a world of trouble at crop time, when attention can be limited to the yield and to the character of the lint and seed.

ADMIXTURE OF SEEDS.

One of the most serious difficulties in maintaining the uniformity of a superior variety of cotton is the mixture of seed in gins. A few farmers (in America) have their own gins or small hand gins for their seed cotton, and in some localities, ginning establishments are beginning to provide small gins that are kept clear for ginning seed cotton. Some farmers take care to avoid the mixture of seed by holding their seed cotton until the end of the season, when the time can be taken to clean out the gin. It is also possible to plant progeny rows or seed plats with unginned seed by wetting the lint before planting or by pressing the seed into moist ground.

The above advice should be taken by those who intend to plant cotton about next September in Queensland, as it emanates from an American expert, Mr. O. F. Cook, Bionomist in Charge of the Bureau of Plant Industry, Washington, U.S.A.

We may mention, in conclusion, that when cotton-growing was largely engaged in in Queensland, during the American Civil war, all kinds of cotton were sowed indiscriminately in the same field. As owners of a ginnery, we bought large quantities of cotton, all mixed—Sea Island, Uplands of unknown varieties, and hybrids. All these went into the same bale and brought high prices in England. But cotton was cotton in those days. To-day what is required is a uniform sample, perfect in all respects, and this end can be attained by careful attention to the plants as they grow and to the flowers and bolls at maturing time. The Department of Agriculture is obtaining the best of varieties for distribution to farmers in this State, and it lies with them to preserve the different types for future planting as above recommended.

GROOVED SUGAR-MILL ROLLERS.

Mr. J. Gordon Lowe, representative in Natal of the well-known sugar machinery firm of Mirrlees, Watson, and Co., Ltd., of Glasgow, recently returned to Durban from Mauritius, and amongst other items. in an interview with a representative of the "Agricultural News," supplied the following information on the grooving of feed rollers:—

He mentioned that his firm hold the patent rights for Messchaert patent juice grooves for sugar-mill rollers, which have been reported on most favourably in all countries where they have been tried. He mentioned that there are forty rollers working on the Messchaert system in various mills in Mauritius, all installed during the past year, and they are giving wonderful results. On its merits the system makes a strong appeal for adoption, and as it becomes better understood it will doubtless be more universally installed.

The "Agricultural News" also publishes an article from the "International Sugar Journal" dealing with recent progress in sugar manufacture in Hawaii, which states:—

"Apparently the grooving of feed rollers in cane-sugar factories will be adopted throughout the whole sugar world, as it has given very highly satisfactory results wherever it has been tried. In the latest ' International Sugar Journal' the following appears in an article dealing with recent progress in sugar manufacture in Hawaii:—

"As it has been proved that there was an advantage in grooving feed rollers so that the pressed-out juice could run away in small streams from the entire length of the roller, it was thought that there might be some benefit from grooving the discharge rollers also. This has proved to be the case during the past season when the right kind of grooves were used and they were kept well cleaned out. In three factories an immediate drop of 3 per cent. in the moisture in the bagasse was noticed when using grooved discharge rollers, which, other things equal, should raise the extraction by 0·2 to 0·3 per cent.

"But it was proved to be of great importance to keep the grooves cleaned out. It was noticed in several factories that the moisture in the bagasse increased progressively each day of the week, and this was ascribed to wearing of the scrapers, which are changed every Sunday. In fact, between Monday and Saturday this increase was, in one series of trials, found to be over 2 per cent. The remedy for this would appear to consist in using a double set of scrapers on the discharge rollers. Another factory obtained the following data of moisture in bagasse per cent.:—

	Per cent
Moisture in bagasse without grooves	44·5
Moisture in bagasse with partially cleaned Messchaert grooves	41·0
Moisture in bagasse with two sets of scrapers	38·0

QUEENSLAND SUGAR-MILLS.

CRUSHING DATES.

The following is the list of crushing dates, as published in the June issue of the "Queensland Sugar Journal," as far as that journal has been advised:—

Australian Sugar Company, Ltd. (Mourilyan), about 14th June.

Baffle Creek Sugar Mill, end of August.

Buss Bros., first week in August.

Farleigh Estate Sugar Company (60,000 odd tons), early in July.

Bingera (Gibson and Howes), middle of July or beginning of August.

Goondi Mill, 14th June.

Inkerman Sugar Mill, middle of July.

Macknade Mill, 14th June.

Marian Central Mill Company, Ltd., third week in July.

Maryborough Sugar Factory, shortly after middle of August.

Millaquin Sugar Company (Doolbi Mill)), end of August or early in September.

Millaquin Sugar Company (Millaquin and Qunaba), late in August or early in September.

Moreton Central Sugar Mill, last week in July.

Mossman Central Mill, 8th June.

Mulgrave Central Mill, 14th June.

Pioneer Sugar Mill, middle of July.

Plane Creek Central Mill (between 40,000 and 50,000 tons of cane), first week in July.

Pleystowe Central Mill, middle of July.

Proserpine Central Mill, first or second week in July.

Victoria Mill, 14th June.

TREATING CANE DAMAGED BY FROST.

In a paper on the handling of cane damaged by frost, Mr. W. E. Cross, of the Tucuman Agricultural Experimenting Station, points out that the difficulties in boiling are mainly due to the viscosity of the juices and syrups, caused by the presence of the gums produced by fermentation. This cannot be removed, and it is the more necessary to exercise care in choosing cane for grinding, and to keep down fermentation as far as possible from the moment the cane enters the sugar-house. A large percentage of molasses necessarily will be obtained; and by leaving the molasses a long period in crystallisers, or after boiling to a suitable density, or for many weeks stored in tanks, a considerable yield of sugar often can be obtained therefrom. In order to reduce the damage caused by a freeze, the practice in Louisiana is to cut the cane, and, without removing the leaves, to lay it in the furrow in such a way that the leaves of the second canes cover the stocks of the first, and so on. This is known as windrowing.—"Agricultural News," Durban, S.A.

THE SISAL HEMP TRADE OF MEXICO.

Notwithstanding the efforts which have been made by the Department of Agriculture and Stock for a number of years to encourage the growing of sisal in this State, the result has been practically nothing. A few private planters entered into the business, and one sugar planter at Childers was remarkably successful in his sisal plantation of some 60 acres. He installed up-to-date machinery, and manufactured the fibre to the tune of over 1½ ton per acre, which left a big profit. It may be asked why he gave it up and reverted to sugar planting. The reason is simple. The land was so rich that in about three and a-half years the plants arrived at maturity, and replanting became necessary, which meant machinery idle for three years more. Sisal planted on poorer soil has, to the writer's knowledge, not arrived at the "poling"—*i.e.*, maturing stage—for twelve years; but as most of the original growers planted on rich soil, they soon abandoned the industry. In Mexico the sisal industry is very important, the annual production of fibre in Yucatan and Campêche amounting to over 1,000,000 bales of 375 lb. each, equal to 16,741 tons. With sisal at the present price of £50 per ton, the value of the crop annually amounts to about £1,000,000.

From a report made lately to the Board of Trade by H. M. Chargé d'Affaires at Mexico city, as reported in the "Indian Trade Journal," it is gathered that until the establishment of the Government Commission for the Regulation of the Henequen ("Sisal") Industry there had never been an absolute monopoly of the hemp business in the States of Yucatan and Campêche, the annual production in which is in excess of 1,000,000 bales, averaging 375 lb. each. Nearly all the farmers producing "sisal" hemp in the two States were recently obliged to contract for five years to sell their hemp exclusively to the Commission (see page 389 of the "Indian Trade Journal" of 10th March). The Commission fixes prices to both producers and buyers, and retains a large share of the profits; it controls the railway service and provides no cars for hemp save to its own customers; and it has opened a bureau in New York for the purpose of convincing American consumers, who take about 80 per cent. of the production of hemp for the manufacture of binder twine, that no monopoly exists. At the present time the price of hemp is unusually high owing to high freight rates for shipping. Apart from this, however, the cost of hemp has been increased by the imposition of a State duty of 10 cents. per kilogramme (2·2046 lb.) and a Federal duty of 1½ cents gold per kilogramme payable in American gold at par. In addition to these duties railway freights have increased by 300 per cent. and warehouse charges at Progreso also by 300 per cent. A corporation formed in New Orleans, styled the Pan-American Commission, receives the hemp sent to the United States and hands it over to the bankers who financed the loan of 10,000,000 dollars to the Government Commission. For this service the Pan-American Commission is to receive 5 per cent. commission on all sales of hemp made by the Government Commission. If 1,000,000 bales of hemp are sold in the United States at an average of 6 cents per lb. the commission payable to the Pan-American Commission will be over 1,000,000 dollars, or 100 per cent. per annum, on its reported capital! 100 cents = 1 dollar (U.S.) = 4s. 1⅓d. at par.

The "Indian Trade Journal" for 10th March above referred to, says:—"His Majesty's Legation at Mexico city reports to the Board of Trade, under date 8th December last, that contracts have been entered into between the Government Commission for the Regulation of the Henequen Industry and the hemp producers of the States of Yucatan and Campêche on a "profit-sharing" basis. The contract in each case was for five years, and during that period all the henequen grown by the producer is to be delivered to the Commission, in return for which the producer will receive a sum of money on account. At the end of five years the Commission will pay a portion of its net profits to the producer in proportion to the amount of henequen received from him. Should there be a loss the Commission will bear it. The contract covers plantations which may be subsequently acquired by the producer, and should the planter transfer his estate the transferee incurs all his rights and liabilities under the contract. It appears, therefore, that the institution of the Commission has, to all intents and purposes, transformed the hempgrowing industry into a Government monopoly."

Entomology.

BEAN FLY AND OTHER PESTS.

By H. TRYON, Government Entomologist, &c.

We frequently receive letters asking us to publish a remedy for the ravages of the French Bean Fly. In reply to one of them, Mr. H. Tryon, Vegetable Pathologist and Entomologist to the Department of Agriculture and Stock, supplies the following information:—

"The fly that attacks the french beans, named *Angromyza phaseoli*, is an insect that is very troublesome to deal with. It is attracted to its host plant in the first instance by the sense of smell, and therefore anything that masks its (the bean) attractive odour should, one might be justified in concluding, serve to protect this plant from being assailed. Similarly, also any substance endowed with a perfume repellent for the insect.

Unfortunately, hitherto, experiments have not led to the discovery of a substance or substances that can invariably be depended upon for exerting the influences mentioned. The substances Mr. W. Weston has employed have a limited use for the purpose in view, but better still appears to be some ammoniacal liquid, such, *e.g.*, as is obtainable where-ever horses are stabled, &c.

However, the principal contributor to the depredations exerted by the fly in destroying the bean is man's own negligence. This results from his practice of leaving bean plants—fatally injured—cumbering the soil, and so adding continuously to the numbers of the destructive insect, instead of promptly burning them and so destroying the pest. When it is entrapped, as it were, in the tissue in which its eggs have been deposited, or rather placed, their death, or the maggots that result from their hatching, is easily accomplishable. The want of action in this direction, especially combined action, is the explanation of the fact that, as the summer progresses, the depredations of the insect, as brood after brood succeed each other, become more and more pronounced.

The Bean Fly, it may be pointed out, is victimised by more than one parasitic hymenopteron, so that in spite of this default its numbers are not naturally augmented to the extent they would be were not such the case; and it results, moreover, from its having natural enemies of this class, that its reduction in numbers when once accomplished will give results more persistent than might be experienced did nothing of the kind occur to aid man's efforts.

As autumn follows summer and winter it, low temperatures, that are more and more prevalent, appear, in turn again, to either kill the insect or to restrain its numerical increase. Thus it happens that beans sown from now onwards for a month or two, escape or almost escape its pernicious attentions; and the knowledge of this fact has induced some horticulturists to limit their growth of this crop to the season indicated accordingly. But beans will grow, and beans are in demand all the year round, and therefore the ingenuity of man should prove superior to the attacks of this their enemy, and one cannot be satisfied until it is so.

The insects described as "White Winged Flying Aphis" and "White Aphis" are unknown to me. Were specimens forthcoming, suggestions for subduing them might be advanced."

GRUB STAGE OF THE CANE-BEETLE.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report from Mr. E. Jarvis, Entomologist to the Bureau:—

This month (June), like the preceding, has been devoted to research work relating to the grub stage of our grey-back cane-beetle.

The principal experiments undertaken have brought to a satisfactory conclusion a long series of investigations concerning a much-talked-of method of remedial control—viz., that of poisoning the grub whilst in the soil.

Preliminary experiments in this connection (not yet reported) were initiated in 1915, but need not be mentioned here, it having been decided by the General Superintendent of the Bureau of Experiment Stations to issue almost at once a bulletin dealing with recent important discoveries, and embodying also a brief survey of early investigations.

During this month 7 inches of rain was recorded at the Mulgrave Central Mill, as against 3.44 inches, the rainfall for Cairns district in April, 1915.

Practically the whole amount fell between the 27th ultimo and 4th May, the mean temperature during this period of eight days being approximately 77.25 degrees F. dry heat, accompanied by an average humidity of 73 degrees F.

The above record acquires scientific interest from the fact that these climatic conditions are evidently favourable to the development of the so-called "Green Miscardine" fungus (*Metarrhezium anisopliae*, Metsc), an outbreak of which in volcanic soil near Neringa was brought under my notice on the 3rd of May.

Upon inquiry I found that the mortality occasioned, although sufficiently marked to have aroused the curiosity of those engaged in collecting grubs, was not excessive, and that the fungus was attacking fully-grown larvæ of the common cane-beetle, *Lepidiota albohirta*, Waterh.

Most canegrowers are familiar with the appearance of grubs killed by this vegetable parasite, as the body, instead of decomposing, retains its shape, and, gradually hardening, turns at first whitish and finally dull green.

The internal organs and fluids of the victim are quickly absorbed, and replaced by vegetable tissue constituting the mycelium or rooting portion of the fungus, until the entire grub becomes as firm as a piece of hard cheese, and can be easily broken into pieces.

As already pointed out in previous reports, it might be found advantageous to artificially disseminate the parasite over grub-stricken areas. Investigations in this direction have hitherto been confined almost exclusively to cage experiments dealing with soil infection, but, owing to work of a more pressing nature supervening, were discontinued some months ago.

For the present I should advise cane-growers to see that all grubs attacked by this fungus are left in the ground, or, better still, broken into powder, which should then be scattered about and, when practicable, buried in the furrows.

The green crust-like covering or fructification of the fungus noticeable on a dead larva, is in reality composed of millions of spores massed together, and only visible under a powerful microscope each of which. however, under congenial circumstances is probably able to infect and destroy a cane grub.

SUGAR-CANE PESTS.

The General Superintendent of the Bureau of Sugar Experiment Stations has received from the Entomologist to the Bureau (Mr. E. Jarvis) the following report:—

"Grubs of the common cane-beetle will soon be going down out of reach of the plough preparatory to pupating, all specimens collected at the laboratory during the present month having been third-stage larvæ, and for the most part fully developed.

"Considerable damage has been occasioned by this insect in the Highleigh and Babinda areas, and at Greenhills it is credited with destroying about 300 acres of cane.

"It appears—from information supplied by the secretary—that grubs received at Mulgrave Central Mill during 1916 season were mostly from Greenhills, Mount Sophia, and Meringa, and that probably the total amount weighed at this mill will be much the same as that recorded last year.

"Mr. L. O. Bailey, secretary of Babinda Canegrowers' Association, advises that receivers in his area have weighed in about 24 cwt. of grubs, the majority of which were collected in the vicinity of McDonnell's Creek.

"In a previous report mention was made of the occurrence at Deeral of the cockchafer *Lepidiota caudata*, a reddish-brown species noticeably larger than our excessively abundant cane-beetle, *L. frenchi*, but slightly smaller than the familiar grey-back. This insect (*caudata*), which breeds extensively in the neighbourhood of scrub lands, was observed about the end of September, 1915, flying among plant cane in sufficient numbers to alarm some of the Babinda growers, one of whom brought a tinful of the beetles to the laboratory for identification.

"It was said to have been responsible for most of the damage to cane in those parts during previous years, so I was disposed to think that it might eventually become firmly established there as a troublesome pest.

"Up to the present, however, recent but very brief investigations at Deeral have afforded no evidence of serious injury to sugar-cane from the attacks of *caudata*.

"Apparently the so-called "Carpet-grass" (*Paspalum platycaule*) is one of its favourite native foods, since out of forty-three grubs collected at random from among the roots of this plant on the 25th instant, no less than 88 per cent. were *caudata*, the remainder being larvæ of our grey-back cane-beetle.

"The grub of the former insect grows to about the same size as that of *albohirta*, but, owing to its having a two years' life-cycle, is, of course, longer in the soil.

"It is proposed to resume investigations regarding the topography of Gordonvale, commenced last season.

"As already pointed out in a former monthly report (' Australian Sugar Journal,' vol. VII., Jan., 1916), this inquiry is likely to prove interesting from an economic as well as scientific standpoint.

"With further reference to the new noctuid moth-pest (*Mocis frugalis*, Fab.) found to be defoliating cane stools at Meringa and Gordonvale last March, I may mention that caterpillars of this insect belonging to a recent brood have again occurred, but this time very sparingly, on young plant-cane in the former locality.

"In the present instance, however, the ground is free from weeds of any kind, and the parent moth has evidently selected the sugar-cane in preference to native grasses, &c., as being a suitable food-plant for its offspring.

"Fortunately this species is not likely to prove hurtful to cane-growers, as it is, no doubt, well controlled by natural enemies; but the above occurrence, although trivial, is not without significance, since it furnishes another illustration of the readiness with which certain insects will acquire a liking for cultivated plants that happen to be closely related to those on which they habitually subsist."

TABLE FOWLS.

The practice of breaking the breast-bone of a table chicken to make it look more attractive on the slab needs only to be mentioned to be condemned. It is a deception calculated to make a bird look to have more breast meat than it really has. All methods tend to break up the breast meat so that it falls to pieces when being carved. The usual ways are to insert a trussing knife from the stern, drive it with some force into the point of breast, twist it, and then press on the breast so as to cause it to fall, and press up the breast meat. Another is to insert a pair of strong scissors and cut a strip off the edge of the breast-bone, and then tap it flat with the haft of the knife. Both displace the meat.—Exchange.

General Notes.

DENATURED SPIRIT OF ALCOHOL.

The Russian Ministry of Finance, according to a message from Reuter, reports the "Indian Trade Journal," is organising an international competition, with prizes ranging up to £3,000, for methods of rendering methylated spirits and similar harmful liquids absolutely undrinkable. A second competition is being arranged, with prizes up to £7,500, for new or improved methods of utilising alcohol for combustible or other purposes. The total rewards will amount to nearly £68,000.

Tropical planters and others in all parts of the world should take an interest in this contest, and try to induce their respective Governments to do the same, as the enormous amount of raw material that is made available every year from the waste products of the Manila fibre, banana, coconut, sugar, cacao, and other industries would allow an output of alcohol suitable for fuel and other purposes sufficient to enable the British Empire and her Allies to be independent of unfriendly nations for their supply of spirit for such purposes. Like Pears' soap baby, we shall not be happy until we have induced the authorities and the planters to combine and put these valuable by-products to so good a use.—H. Hamel Smith in "Tropical Life."

Denatured alcohol is simply alcohol which has been so treated as to spoil it for use as a beverage or medicine, and prevent its use in any manner except for industrial purposes. Denaturing can be accomplished in many ways. In England a mixture suitable for industrial purposes, but unfit for any other use, is made by mixing 90 per cent. of ethyl alcohol (alcohol made from grain, potatoes, beets, &c.) with 10 per cent. of methyl or "wood alcohol." In Germany some of the other denaturants are camphor, chloroform, iodoform, ethyl bromide, benzine, castor oil, &c.

In a very interesting work on the subject by F. B. Wright, U.S.A., full details are given as to the various methods of producing the desired results, and mention is made of the uses to which denatured alcohol may be put. For instance, he says it is a safe fuel. Although it has only about half the heating power of kerosene or gasoline, gallon for gallon, yet it has many valuable properties which may enable it to compete successfully in spite of its lower fuel value. In the first place, it is very much safer. Alcohol has a tendency to simply heat the surrounding vapours and produce currents of hot gases which are not usually brought to high enough temperature to inflame articles at a distance. It can be easily diluted with water, and when so diluted, no more than one-half, it ceases to be inflammable. Hence it may readily be extinguished, while burning gasoline, by floating on the water, simply spreads its flame when water is applied to it.

When alcohol is used for lighting purposes, the general estimate of its value gives it about double the power of kerosene, a gallon of alcohol lasting as long as 2 gallons of the oil. When used for street lighting, alcohol vapour burns like gas with an incandescent flame in a hooded flame covered by a Welsbach mantle. This light rivals the arc light in brilliancy, and requires to be shaded to adapt it to the endurance of the human eye. Alcohol can also be employed in the same manner as gas in cooking stoves.

Mr. J. C. Brünnich, Agricultural Chemist, writing on Neglected Industries, mentioned amongst other items the shortage of methylated spirit in Brisbane, and presumably throughout Australia, which, he said, was due to the shortage of molasses last year.

He was unable to understand why we did not make good the shortage by manufacture from other materials such as maize, of which the Atherton district at present had a record crop. A bushel of maize (56 lb.) would yield about 5 U.S. gallons of proof spirit, or 2½ gallons of absolute alcohol. One gallon of molasses would yield about four-tenths of a gallon of alcohol. One bushel of sweet potatoes (54 lb.) would give about half a gallon of absolute alcohol, and ordinary potatoes might be expected to give a similar quantity.

Mr. Brünnich said that another excellent article very largely used in America was cassava (arrowroot), which was known to yield very heavy crops in some parts of Queensland, and this would give about the same amount of alcohol as sweet potatoes.

The Agricultural Chemist pointed out that alcohol could be used for driving gas engines for ordinary running, but it had not been found suitable for running motor-cars, as it had not the flexibility of petrol, such as is required for frequent starting, and running at slow speed. The difficulty was reported to have been overcome in Germany by the addition of a certain amount of bezol (benzene), which was a by-product of coal distillation, and which could be produced in this country. Alcohol, however, could be used in certain classes of lamps, and it was one of the cheapest of fuels and sources of light.

A secondary product of alcohol was acetic acid, which was also in very short supply. Mr. Brünnich suggested spoiled pineapples and apples as sources of supply. In connection with the latter crop, visitors to Southern States had said that the waste of apples owing to difficulties of transport was extraordinary.

Mr. Brünnich expressed the opinion that little or no kerosene should be imported into Australia; it could be largely, if not entirely, replaced by the production of our own alcohol. He pointed out that there were numerous other products which could be produced in Australia at a profit at present prices—even if not profitable to produce under normal conditions.

A SUBSTITUTE FOR PARIS GREEN.

The "Cotton Oil News," Texas, U.S.A., says:—Paris green costs more than twice as much this year as last. It is selling at 50 cents per lb. even in large quantities. It is doubtful whether it can be purchased for less than 45 cents per lb. Fortunately, says A. G. Ruggles, University Farm, St. Paul, arsenate of lead, a better stomach insecticide than Paris green, has not advanced in price. The powdered form may be obtained for about 25 cents per lb., and 1½ lb. of the powder is used in making 50 gallons of spray mixture.

"In experiments at University Farm," adds Mr. Ruggles, "we have found arsenate of lead better than Paris green as a remedy for potato bugs and all orchard insects. It is not necessary, therefore, to allow injurious biting insects to live simply because Paris green is costly."

FRUIT AND COTTAGE GARDEN COMPETITION.

The National Association has announced that the cottage garden competition will be conducted this year on similar lines to that adopted in 1915, and invites inquiries from intending competitors. Possibly the most important of the new features introduced this year will be a district fruitgrowing competition. For this purpose the National Association has divided the fruitgrowing portions of Queensland into fourteen districts, and £100 has been allotted as prize money for the districts competing next August. The government of the competition is much on the lines of the well-known district exhibits, the amount of the award depending upon the points scored. The scale of points and all other particulars will be made available to intending competitors upon application to the secretary, Mr. J. Bain, Courier Building. Mr. A. H. Benson, Director of Fruit Culture, is hon. steward of this section, and is keenly interested in its success. He is of opinion that the individuality of the various districts, and their worth from a fruitgrowing point of view, can be illustrated by means of a competition such as this.

SNAKES AND PORK.

We get some strange ideas often from the U.S.A. We have heard of rattle-snake farms, wolf farms, and alligator farms. Here is another reputed great discovery by an American farmer, who is stated to have found that feeding pigs on snakes imparts a delicious flavour to the pork. The farm concerned, it appears, was infested with snakes, which defied all efforts at extermination. Several specimens of a breed of small black pigs were bought and turned loose on the farm. Some time later the farmer received a surprise in the form of a letter from a New York restaurant, which, after several weeks, had succeeded in tracing to the farmer a shipment of pork which had caused much favourable comment by patrons. It appeared that the pork had gained a peculiarly rich, gamey flavour, and the restaurant proprietor contracted with the farmer for all the pork he could raise.

TANNING A HIDE.

DEPILATION.

The first operation to which hides are subjected is depilation, which removes not only the hair but also the scarf-skin. This is effected variously. The most common plan in England is to throw the hide or skin into a strong watery ley of slaked lime, with lime in excess. By this, in a few days, the hair is easily detached. In America, the sweating is performed cold; the hides are hung up wet in a damp cellar, and are kept moist for ten days or a fortnight. Then, incipient putrefaction takes place, when the hair and scarf-skin are easily removed. One hundred pounds of hide will take 300 lb. of bark, oak or wattle, yielding 40 to 50 lb. of leather.

Wattle bark, as well as other tanning bodies, are reduced to a small and uniform size by grinding machinery. The new bark, over which is pumped cold water, is put into one pit and the liquor passes from one stage to another till the whole of the tannin is extracted. This takes from three to eight months.

AN EFFECTIVE GATE-FASTENER.

Of the numerous gate-fasteners which have been invented by ingenious men, many of which have been described and illustrated in the "Queensland Agricultural Journal" during the past nineteen years, the accompanying sketches seem to us to be amongst the best, if not the best, of any we have yet seen. They appeared in the latest issue of the "Farmers' Advocate," Bloemfontein, S.A. The sketches explain the working of the fastener. A triangular piece of iron working on a pin passes through the staple, and as soon as it does so drops down automatically at right angles, making it almost impossible for the gate to be opened by accident.

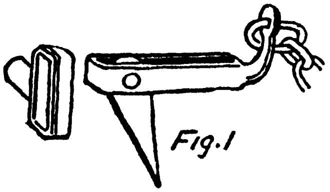

Fig. 1

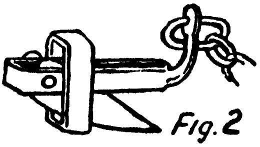

Fig. 2

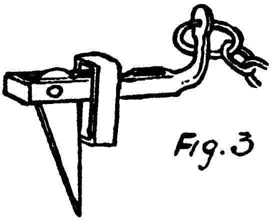

Fig. 3

THE WORKERS' COMPENSATION ACT OF 1916.

The Insurance Commissioner announces in our advertisement column that Forms of Application for Insurance under the above Act may now be obtained at the State Accident Insurance Office, Parbury House, Eagle street, Brisbane, and from all clerks of petty sessions, and at all railway stations and branches and agencies of the Government Savings Bank.

The lodging of an application will act as a cover to the employer from the date of commencement of the Act, until the policy can be issued.

It is anticipated that the Act will be brought into force on 1st July, and the Commissioner hopes that employers will send in their applications as soon as possible.

REGULATION OF SUGAR-CANE PRICES ACT.

LOCAL BOARD AWARDS.

GOONDI.—The Goondi Local Board has issued an award under the Sugar Cane Prices Act, providing that the price of cane supplied by the canegrowers to the Goondi mill for the season 1916 shall be paid by group analysis according to the following schedule (with proportionate payments between the various p.o.c.s. units). Groups consisting of one or more growers:—7 p.o.c.s., 11s.; 8 p.o.c.s., 14s.; 9 p.o.c.s., 17s.; 10 p.o.c.s., 20s.; 11 p.o.c.s., 23s.; 12 p.o.c.s., 26s.; 13 p.o.c.s., 28s.; 14 p.o.c.s., 30s.; 15 p.o.c.s., 32s.; 16 p.o.c.s., 34s.; 17 p.o.c.s., 36s.; 18 p.o.c.s., 38s. Provision has been made for payment for burnt cane at from 1s. to 2s. per ton deduction. Deductions are also to be made for diseased, badly-topped, and trashy canes, and for cane of varieties not approved. This award is to operate for twelve months from 1st June, 1916. The varieties approved by the Local Board are—Badila, N.G. 24A, 24B, H.Q. 426, and Clark's Seedling.

PALMS MILL.—The award made by the Palms Local Board under the Regulation of Sugar Cane Prices Act provides for the payment for cane at the rate of 28s. 6d. per ton. Deductions are to be made for burnt, frosted, or diseased sugar-cane or badly-topped or trashy sugar-cane, or varieties of sugar-cane, the growing of which has been disapproved by the Local Board with the sanction of the Central Board, in accordance with the rate and manner decided upon by the Central Cane Prices Board. The award is to have effect for 12 months from 20th April last.—From the "Australian Sugar Journal."

Answers to Correspondents.

EUPHORBIA PILULIFERA.

A firm in South India (writes the editor of the "Indian Trade Journal") desires to be placed in touch with suppliers of *Euphorbia pilulifera.* Particulars may be obtained from the Director-General of Commercial Intelligence, New Imperial Secretariat, 1 Council House street, Calcutta.

CROSSBRED SHEEP.

F. GRADULE—

The pamphlets you ask for are forwarded, under separate cover.

Your questions, answered by Mr. W. G. Brown, Instructor in Sheep and Wool, in the order you put them are:—

1. Do you consider Corriedales good dual purpose sheep?—I have a limited experience of this breed, but what I know of them indicates that they are excellent sheep for comparatively dry areas. I have samples of wool grown by Mr. T. Greenwood at Longreach which reached very high prices recently. The sheep were bred at Toeal, Longreach. The sheep I know did well.

2. Do you consider Corriedale and merino a good cross for fat-lamb raising?—That is a question which remains to be proved in Queensland. There is no doubt that mutton and wool of this breed are excellent.

3. Do you consider crossbreds suitable for Goondiwindi?—Yes.

4. Would you prefer a Border Leicester and merino cross or Corriedale?—Border Leicester.

5. Will crossbreds stand a dry time as well as merinos?—Some crosses, more particularly the Border Leicester, are good doers in a dry time. The heavier sheep, such as the Lincoln, being gross feeders, are not so likely to do as well. Merinos, of course, are a dry-country sheep, and are likely to do better, if plain bodied, than any other breed.

Upon the whole the Goondiwindi district is merino country, therefore the nearer the cross is to merino the better, if crossbreds be taken on your country.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JUNE, 1916.

Article.		JUNE Prices.
Bacon	lb.	1s. 1¾d. to 1s. 3½d.
Barley	bush.	...
Bran	ton	£7
Broom Millet	„	£37
Butter	cwt.	140s.
Chaff, Mixed	ton	£5 10s.
Chaff, Oaten	„	£4 to £5 10s.
Chaff, Lucerne	„	£5 10s. to £8
Chaff, Wheaten	„	£5 to £5 10s.
Cheese	lb.	9d
Flour	ton	£12 5s.
Hams	lb.	1s. 3d. to 1s. 4d.
Hay, Oaten (Victorian)	ton	...
Hay, Lucerne	„	£6 to £7
Honey	lb.	6d.
Maize	bush	4s. 8d. to 4s. 10d.
Oats	„	3s. 10d.
Onions, Spanish	ton	£5 15s.
Peanuts	lb.	2d. to 3d.
Pollard	ton	£6 10s.
Potatoes	„	£7 to £10 10s.
Potatoes (Sweet)	„	£6 to £6 5s.
Pumpkins	„	£2 5s.
Eggs	doz.	1s. 10d. to 2s.
Fowls	pair	5s. 6d to 7s.
Ducks, English	„	5s. to 5s. 6d.
Ducks, Muscovy	„	6s. to 7s. 9d.
Geese	„	8s. 6d. to 9s.
Turkeys (Hens)	„	9s. to 11s. 6d.
Turkeys (Gobblers)	„	15s. to 25s.
Wheat	bush.	5s. to 5s. 6d.

VEGETABLES—TURBOT STREET MARKETS.

Cabbages, per dozen	1s. 6d. to 5s. 6d.
Beans, per sugar bag	1s. 6d. to 5s. 6d.
Beetroot, per dozen bunches	9d. to 1s.
Carrots, per dozen bunches	9d. to 1s. 2d.
Chocos, per quarter-case	1s. 9d. to 2s. 3d.
Cucumbers, per dozen	9d. to 1s. 3d.
Custard Marrows, per dozen	1s. to 2s.
Vegetable Marrows, per dozen	Unsaleable
Peas, per sugar bag	4s. 6d. to 7s. 6d.
Celery, per bunch	1s. to 1s. 4d.
Sweet Potatoes, per cwt.	2s. 6d. to 3s. 6d.
Table Pumpkins, per dozen	2s. 6d. to 4s. 6d.
Tomatoes, per quarter-case	5s. 6d. to 7s. 6d.
Turnips, per dozen bunches	4d. to 6d.
Rhubarb, per dozen bundles	...

SOUTHERN FRUIT MARKETS.

Article.	MAY. Prices.
Bananas (Queensland), per case	8s. to 12s.
Bananas (Fiji), per case	13s. 6d. to 14s. 6d
Bananas (G.M.), per bunch	17s. 6d.
Custard Apples, per tray	4s. to 6s.
Mandarins, per case	8s. to 13s.
Mangoes, per case	...
Oranges (Navel), per case	10s. to 13s.
Oranges (other), per case	5s. to 10s.
Passion Fruit, per half-bushel case	3s. to 6s.
Lemons (Local), per bushel case	7s. to 11s.
Papaw Apples, per double-case	9s. to 11s.
Persimmons, per half-case	...
Pineapples (Queens), per double-case	5s. to 8s.
Pineapples (Ripleys), per double-case	4s. to 6s.
Pineapples (Common) per double-case	5s. to 7s.
Tomatoes, per quarter-case	3s. to 5s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	JUNE. Prices.
Apples, American, per case	3s. to 7s.
Apples, Cooking, per quarter-case	2s. to 4s.
Bananas (Cavendish), per dozen	2½d. to 6¼d.
Bananas (Sugar), per dozen	2d. to 4d.
Citrons, per cwt.	10s.
Cocoanuts, per sack	12s. to 15s.
Custard Apples, per quarter-case	4s.
Lemons (Lisbon), per half-case	4s. to 7s.
Lemons (Italian), per case	...
Limes, per quarter-case	...
Mandarins (Local), per half-case	10s. to 14s.
Mangoes, per case	...
Nectarines, per quarter-case	...
Oranges, (Navel), per case	10s. 6d. to 12s.
Oranges (other), per case	5s. to 7s.
Oranges (Seville), per cwt.	10s.
Papaw Apples, per quarter-case	1s. 6d. to 2s. 6d.
Passion Fruit, per quarter-case	5s. to 7s. 6d.
Peaches, per case	...
Pears, per half-bushel case	9s. to 10s
Peanuts, per pound	2½d. to 4d.
Persimmons, per quarter-case	...
Plums, per case	...
Pineapples (Ripleys), per dozen	2s. to 4s.
Pineapples (Rough), per dozen	2s. to 4s.
Pineapples (Smooth), per dozen	2s. to 4s. 6d.
Quinces, per case	...
Rockmelons, per dozen	...
Rosellas, per sugar bag	1s. to 2s.
Strawberries, per dozen pint boxes	...
Tomatoes, per quarter-case	2s. 9d. to 7s.
Piemelons, per dozen	...
Watermelons, per dozen	...

TOP PRICES, ENOGGERA YARDS, MAY, 1916.

Animal.	MAY. Prices.
Bullocks	£15 15s. to £20 10s.
Bullocks (Single)	...
Cows	£8 5s to £14 5s.
Merino Wethers	36s. 3d.
Crossbred Wethers	31s. 6d.
Merino Ewes	21s 3d.
Crossbred Ewes	34s. 9d.
Lambs	35s.
Pigs (Porkers)	80s.
Pigs (Slips)	...

LONDON QUOTATIONS.

London, 10th June.

Jute, August shipment from Calcutta, £33 per ton.

The hemp market is dull. New Zealand, good to fair, August-October shipment, £48 10s. per ton.

Rubber, fine hard Para, 2s. 8½d. per lb.; plantation first latex crepe, 2s. 6⅝d.; smoked sheet, 2s. 5¾d.

Copra, South Sea, May-June shipment, £31 10s. per ton (quotation nominal).

The market for frozen rabbits is firm, and prices are unchanged.

Raw linseed oil, spot pipes, £34 10s. per ton.

The Liverpool quotation for middling American cotton, June-July shipment, is 8·095d. per lb.

Mexican Sisal.—For European consumption orders at full prices for considerable quantities have been cabled out, but have not been executed. All stocks have been disposed of, and the only and principal shippers assert that they have over-sold.

British East African Sisal.—This continues in good demand, and values remain at £55 to £60 per ton according to quality.

Statistics,

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MAY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING MAY, 1916 AND 1915, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	May	No. of Years' Records.	May, 1916	May, 1915
North Coast.	In.		In.	In
Atherton	2·05	15	1·92	0·60
Cairns	4·58	34	3·60	3·27
Cardwell .. .	3·65	44	1·72	0·47
Cooktown	2·95	40	4·66	0·81
Herberton	1·57	29	1·46	0·87
Ingham .. .	3·53	24	1·97	0·67
Innisfail	12·16	35	6·60	6·74
Mossman	2·10	5	3·39	0·59
Townsville	1·39	45	0·60	0·36
Central Coast.				
Ayr	1·16	29	0·89	0·34
Bowen	1·39	45	1·31	0·13
Charters Towers ...	0·80	31	0·73	Nil
Mackay	3·96	45	3·19	1·19
Proserpine	5·58	13	5·28	1·25
St. Lawrence ..	1·92	45	0·62	0·86
South Coast.				
Biggenden	2·09	14	2·42	0·73
Bundaberg	2·85	33	1·45	1·82
Brisbane	2·94	65	1·01	2·48
Childers	2·42	21	3·61	0·45
Crohamhurst ...	5·30	22	2·20	3·78
Esk	2·25	29	0·91	0·82
Gayndah	1·67	45	0·50	1·60
Gympie	3·16	46	1·75	2·5[illegible]
Glasshouse M'tains	2·82	6	1·60	7·28
Kilkivan	2·09	37	0·91	1·07
Maryborough ...	3·07	45	5·76	2·18
South Coast—continued:	In.		In.	In.
Nambour . ..	5·03	20	3·84	3·95
Nanango . ..	1·72	34	0·96	0·74
Rockhampton ..	1·61	29	0·14	0·84
Woodford	3·03	29	1·52	2·57
Darling Downs.				
Dalby	1·39	46	0·80	0·52
Emu Vale ...	1·12	17	0·79	1·63
Jimbour ...	1·41	24	0·49	0·53
Miles	1·77	31	0·13	1·00
Stanthorpe ...	2·05	43	0·94	2·64
Toowoomba ..	2·43	44	0·45	2·24
Warwick	1·77	29	0·45	4·00
Maranoa.				
Roma	1·64	42	Nil	1·43
State Farms, &c.				
Bungeworgorai .	0·86	3	Nil	1·14
Gatton College ..	1·96	14	0·30	1·96
Gindie	1·11	13	Nil	1·42
Hermitage ...	0·91	7	0·76	1·98
Kairi	1·27	3	1·34	0·60
Kamerunga Nurs'y	4·48	27	3·31	2·33
Sugar Experiment Station, Mackay	3·81	16	2·91	2·12
Warren	0·44	3	0·06	1·26

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for May this year and for the same period of 1915, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
Divisional Officer.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET AT BRISBANE AND THE PHASES OF THE MOON FOR THE SECOND FOUR MONTHS OF 1916.

Date.	MAY.		JUNE.		JULY.		AUGUST.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets
1	6·14	5·16	6·31	5·0	6·40	5·3	6·30	5·18
2	6·14	5·15	6·31	5·0	6·40	5·4	6·30	5·18
3	6·15	5·14	6·32	5·0	6·40	5·4	6·29	5·19
4	6·15	5·13	6·32	5·0	6·40	5·4	6·29	5·20
5	6·16	5·13	6·33	5·0	6·40	5·4	6·28	5·20
6	6·17	5·12	6·33	5·0	6·40	5·5	6·28	5·20
7	6·17	5·12	6·34	5·0	6·40	5·5	6·27	5·21
8	6·18	5·11	6·34	4·59	6·40	5·6	6·26	5·21
9	6·18	5·10	6·35	4·59	6·39	5·6	6·25	5·22
10	6·19	5·10	6·35	4·59	6·39	5·7	6·24	5·23
11	6·19	5·9	6·35	4·59	6·39	5·7	6·23	5·23
12	6·20	5·9	6·35	4·59	6·39	5·7	6·22	5·24
13	6·20	5·8	6·36	4·59	6·39	5·8	6·21	5·25
14	6·21	5·8	6·36	4·59	6·39	5·8	6·20	5·25
15	6·21	5·7	6·36	4·59	6·39	5·9	6·19	5·26
16	6·22	5·7	6·37	4·59	6·38	5·9	6·18	5·26
17	6·22	5·6	6·37	4·59	6·38	5·10	6·17	5·26
18	6·23	5·6	6·38	5·0	6·37	5·10	6·17	5·27
19	6·24	5·5	6·38	5·0	6·37	5·11	6·16	5·27
20	6·24	5·5	6·38	5·0	6·36	5·12	6·15	5·28
21	6·25	5·4	6·38	5·0	6·36	5·12	6·14	5·28
22	6·26	5·4	6·39	5·1	6·36	5·12	6·13	5·28
23	6·26	5·3	6·39	5·1	6·35	5·13	6·12	5·29
24	6·27	5·3	6·39	5·1	6·35	5·13	6·11	5·29
25	6·27	5·2	6·39	5·1	6·34	5·14	6·10	5·30
26	6·28	5·2	6·39	5·1	6·33	5·15	6·9	5·30
27	6·28	5·1	6·40	5·2	6·33	5·15	6·8	5·30
28	6·29	5·1	6·40	5·2	6·32	5·16	6·7	5·31
29	6·29	5·1	6·40	5·2	6·32	5·16	6·6	5·31
30	6·30	5·0	6·40	5·3	6·31	5·17	6·5	5.32
31	6·30	5·0	...	...	6·31	5·17	6·4	5·32

The Phases of the Moon commence at the times stated on or near the 150th Meridian, East Longitude.

			H.	M.	
2 May	●	New Moon	3	29	p.m.
10 ,,	☾	First Quarter	6	47	,,
18 ,,	○	Full Moon	12	11	a.m.
24 ,,	☽	Last Quarter	3	16	p.m.

The moon will be farthest from the earth on the 7th, and nearest on the 19th

1 June	●	New Moon	5	37	a.m.
9 ,,	☾	First Quarter	9	59	,,
16 ,,	○	Full Moon	7	42	,,
22 ,,	☽	Last Quarter	11	16	p.m.
30 ,,		New Moon	8	43	,,

The moon will be farthest from the earth on the 4th, and nearest on the 16th at midnight.

8 July	☾	First Quarter	9	55	a.m.
15 ,,	○	Full Moon	2	40	,,
22 ,,	☽	Last Quarter	9	33	,,
30 ,,	●	New Moon	12	15	p.m.

The moon will be nearest to the earth on the 15th, and farthest from it on the 28th

7 Aug.	☾	First Quarter	5	6	a.m.
13 ,,	○	Full Moon	10	0	p.m.
21 ,,	☽	Last Quarter	10	52	,,
29 ,,	●	New Moon	3	25	a.m.

The moon will be nearest to the earth on the 12th, and farthest from it on the 25th

A partial eclipse of the moon will occur on 15th July at 2 30 p m., when the moon will be below the horizon in Australia.

An eclipse of the sun will take place on 30th July It will be partial only in Queensland but annular, or leaving the edge of the sun visible as a magnificent golden ring at Adelaide, and in a line across the south-west of Australia.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise and sunset are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during May, June, July, and to the middle of August may be roughly arrived at by adding 20 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

Farm and Garden Notes for August.

This and the following two months are about the busiest periods of the year so far as work in the field is concerned; and the more activity now displayed in getting in the summer crops, the richer will be the reward at harvest time. Potatoes should be planted, taking care to select only good sound seed that has sprouted. This will ensure an even crop. Yams, arrowroot, ginger, sisal hemp, cotton, and sugar-cane may now be planted. Sow maize for an early crop. If the seed of prolific varieties is regularly saved, in the end it will not be surprising to find from four to six cobs on each stalk. This has been the experience in America, where the selecting of seeds has been reduced to a fine art.

In choosing maize for seed, select the large, well-filled, flat grains. It has been shown that, by constantly selecting seed from prolific plants, as many as five and six cobs of maize can be produced on each stalk all over a field. A change of seed from another district is also beneficial. Sow pumpkins, either amongst the maize or separately, if you have the ground to spare. Swede turnips, clover, and lucerne may be sown, but they will have to contend with weeds which will begin to vigorously assert themselves as the weather gets warmer; therefore keep the hoe and cultivator constantly going in fine weather. Tobacco may be sown during this month. If vines are available, sweet potatoes may be planted towards the end of the month. In this case also it is advisable to avoid too frequent planting of cuttings from the old vines, and to obtain cuttings from other districts. If grasses have not yet been sown, there is still time to do so, if the work be taken in hand at once. Sugar-cane crushing will now be in full swing, and all frosted cane in the Southern district should be put through the rollers first. Plough out old canes, and get the land in order for replanting. Worn out sugar lands in the Central and Northern districts if not intended to be manured and replanted will bear excellent crops of sisal hemp. Rice and coffee should already have been harvested in the North. The picking of Liberian coffee, however, only begins this month. Collect divi-divi pods. Orange-trees will be in blossom, and coffee-trees in bloom for the second time. As this is generally a dry month in the North, little can be done in the way of planting.

Kitchen Garden.—Nearly all spring and summer crops can now be planted. Here is a list of seeds and roots to be sown which will keep the market gardeners busy for some time: Carrots, parsnip, turnip, beet, lettuce, endive, salsify, radish, rhubarb, asparagus, Jerusalem artichoke, French beans, runner beans of all kinds, peas, parsley, tomato, egg-plant, sea-kale, cucumber, melon, pumpkin, globe artichokes. Set out any cabbage plants and kohl-rabi that are ready. Towards the end of the month plant out tomatoes, melons, cucumbers, &c., which have been raised under cover. Support peas by sticks or wire-netting. Pinch off the tops of broad beans as they come into flower to make the beans set. Plough or dig up old cauliflower and cabbage beds, and let them lie in the rough for a month before replanting, so that the soil may get the benefit of the sun and air. Top dressing, where vegetables have been planted out, with fine stable manure has a most beneficial effect on their growth, as it furnishes a mulch as well as supplies of plant food.

Flower Garden.—All the roses should have been pruned some time ago, but do not forget to look over them occasionally, and encourage them in the way they should go by rubbing off any shoots which tend to grow towards the centre. Where there is a fine young shoot growing in the right direction, cut off the old parent branch which it will replace. If this work is done gradually it will save a great deal of hacking and sawing when next pruning season arrives. Trim and repair the lawns. Plant out antirrhinums (snapdragon), pansies, hollyhocks, verbenas, petunias, &c. Sow zinnias, amaranthus, balsam, chrysanthemum, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins; and plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. In the case of dahlias, however, it will be better to place them in some warm moist spot, where they will start gently and be ready to plant out in a month or two. It must be remembered that this is the driest of our months. During thirty-eight years the average number of rainy days in August was seven, and the mean average rainfall 2·63 in., and for September 2·07 in., increasing gradually to a rainfall of 7·69 in. in February.

Orchard Notes for August.

THE SOUTHERN COAST DISTRICTS.

The remarks that have appeared in these notes during the last few months respecting the handling and marketing of Citrus Fruits apply equally to the present month. The bulk of the fruit, with the exception of the latest ripening varieties in the latest districts, is now fully ripe, and should be marketed as soon as possible, so that the orchards can be got into thorough order for the Spring growth. All heavy pruning should be completed previous to the rise in the sap; and where Winter spraying is required, and has not yet been carried out, no time should be lost in giving the trunks, main branches, and inside of the trees generally a thorough dressing with the lime and sulphur wash.

Where there are inferior sorts of seedling citrus trees growing, it is advisable to head same hard back, leaving only the main trunk and four or five well balanced main branches cut off at about 2 ft. from the trunk. When cut back give a good dressing with the lime and sulphur wash. Trees so treated may either be grafted with good varieties towards the end of the month or early in September; or, if wished, they may be allowed to throw out a number of shoots, which should be thinned out to form a well balanced head, and when large enough should be budded with the desired variety.

Grafting of young stock in nursery, not only citrus but most kinds of deciduous fruits, can be done this month. It comes in useful in the case of stocks that have missed in budding, but for good clean grown stocks I prefer budding.

In the case of working our Seville orange stocks to sweet oranges, grafting is, however, preferable to budding, as the latter method of propagation is frequently a failure. The Seville stock should be cut off at or a little below the surface of the ground. If of small size, a single tongue graft will be sufficient, but if of large size, then the best method is the side graft—two or more grafts being placed in each stock, so as to be certain of one taking. In either case the grafts are tied firmly in place, and the soil should be brought round the graft as high as the top bud. If this is done, there will be few missed, and undesirable Seville stocks can be converted into sweet oranges.

In selecting wood for grafting, take that of the last season's growth that has good full buds and that is well-matured—avoid extra strong, or any poor growths.

Seville oranges make good stocks for lemons. In case it is desirable to work them on to lemons, it is not necessary to graft below ground, as in the case of the sweet orange, but the stock can be treated in the same manner as that recommended in the case of inferior oranges—viz., to head hard back, and bud on the young shoots.

Where orchards have not already been so treated, they should now be ploughed so as to break up the crust that has been formed on the surface during the gathering of the crop, and to bury all weeds and trash. When ploughed, do not let the soil remain in a rough, lumpy condition, but get it into a fine tilth, so that it is in a good condition to retain moisture for the trees' use during Spring. This is a very important matter, as Spring is our most trying time, and the failure to conserve moisture then means a failure in the fruit crop, to a greater or lesser extent.

Where necessary, quickly-acting manures can be applied now. In the case of orchards, they should be distributed broadcast over the land, and be harrowed or cultivated in; but, in the case of pines, they should be placed on each side of the row, and be worked well into the soil.

The marketing of pines, especially smooths, will occupy growers' attention, and where it is proposed to extend the plantations the ground should be got ready, so as to have it in the best possible condition for planting, as I am satisfied that the thorough preparation of the land prior to planting pines is money very well spent.

The pruning of all grape vines should be completed, and new plantings can be made towards the end of the month. Obtain well-matured, healthy cuttings, and plant them in well and deeply worked land, leaving the top bud level with the surface of the ground, instead of leaving 6 or 7 in. of the cutting out of the ground to dry out, as is often done. You only want one strong shoot from your cutting, and from this one shoot you can make any shaped vine you want. Just as the buds of the vines begin to swell, but before they burst, all varieties that are subject to black spot should be dressed with the sulphuric acid solution—viz., three-quarters of a pint of commercial sulphuric acid to one gallon of water; or, if preferred, this mixture can be used instead—viz., dissolve 5 lb. of sulphate of iron (pure copperas) in one gallon of water, and when dissolved add to it half a pint of sulphuric acid.

THE TROPICAL COAST DISTRICTS.

Bananas should be increasing in quality and quantity during the month, and though, as a rule, the fruit fly is not very bad at this time of the year, still it is advisable to take every care to keep it in check. No over-ripe fruit should be allowed to lie about in the gardens, and every care should be taken to keep the pest in check when there are only a few to deal with, as, if this is done, it will reduce the numbers of the pest materially later on in the season. The Spring crop of oranges and mandarins will be now ready for marketing in the Cardwell, Tully, Cairns, and Port Douglas districts. For shipping South see that the fruit is thoroughly sweated, as unless the moisture is got rid of out of the skins the fruit will not carry. Should the skins be very full of moisture, then it will be advisable to lay the fruit on boards or slabs in the sun to dry; or, if this is not possible, then the skin of the fruit should be artificially dried by placing same in a hot chamber, as the moisture that is in the skin of our Northern-grown citrus fruits must be got rid of before they will carry properly.

Papaws and granadillas should be shipped South, and the markets tested. If carefully packed in cases holding only one layer of fruit, and sent by cold storage, these fruits should reach their destination in good order. Cucumber and tomato shipments will be in full swing from Bowen. Take care to send nothing but the best fruit, and don't pack the tomatoes in too big cases, as tomatoes always sell on their appearance and quality.

THE SOUTHERN AND CENTRAL TABLELANDS.

All fruit-tree pruning should be finished during the month, and all trees should receive their winter spraying of the lime and sulphur wash.

All new planting should be completed, orchards should be ploughed and worked down fine, and everything got ready for Spring.

In the warmer parts, grape-pruning should be completed, and the vines should receive the Winter dressing for black spot. In the Stanthorpe district grape-pruning should be delayed as late as possible; so as to keep the vines back, as it is not early but late grapes that are wanted, and the later you can keep your vines back the better chance they have of escaping Spring frosts.

Towards the end of the month inferior varieties of apples, pears, plums, &c., should be worked out with more desirable kinds; side, tongue, or cleft grafting being used. In the case of peaches, almonds, or nectarines, I prefer to head back and work out by budding on the young growth.

QUEENSLAND AGRICULTURAL JOURNAL

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Agriculture.

THE CULTIVATION OF SWEET POTATOES.

From several districts we hear complaints of the deterioration of sweet potatoes owing, in many cases, to the attacks of the weevil or worm, and also to the tubers running out into long, thin roots. It should be understood that deterioration and disease result from the constant planting of cuttings from the same stock, and also that the best soil for sweet potatoes, in which they develop their best qualities and attain their largest size, is a fairly rich, dry, sandy loam, or a light volcanic soil in which there is not an over-abundance of nitrogenous matter. Heavy crops cannot be expected on heavy, rich, black soils. On the latter there may be an exuberant growth of vines, but very few good tubers, the majority of these running out, as said, into long, thin roots. The tuber does very well after a cleanly cultivated corn crop.

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When sweet potatoes have been grown year after year on the same land, the soil becomes "potato sick." It is unquestionably bad farming to plant them for the third time in succession on the same land. Although a heavy dressing of potash and phosphoric acid overcomes the sickness, it is far better and less expensive to grow some other crop on the land for a while, especially as potash is no longer obtainable.

The land should be ploughed deeply, and (on the coast) should be thrown up into flat ridges from 3 to 4 ft. apart. In the drier Western country the planting should be on the flat.

PLANTING.

The sweet potato is usually propagated by cuttings from the vines about 8 to 12 in. in length. As, however, constant planting from the same crop results in deterioration, it is imperative to obtain for, at most, the third planting, cuttings from another district. The top of the ridge is opened with the plough, and the cuttings are set slanting about 18 in. apart. The soil is then thrown back by a specially made plough, and pressed against each plant with the foot. Planting with the plough, however, results in many misses, owing to the fact that the soil cannot be pressed firmly enough round the cuttings. A dibble is preferable, such as is used in planting out cabbages. This is, of course, tedious work, but a steady worker can plant from one-third to half an acre a day. If the work is well done, and the weather favourable, the cuttings will be well rooted within a week.

The sweet potato is exceedingly sensitive to cold. The slightest frost will destroy the vine, and it should not be forgotten that frosts have occurred as late as October, as in 1899. The planting season is usually September in the Southern districts, and good crops have been raised by planting a month or two later.

There are two other ways of raising this crop. One is by seed. The sweet potato belongs to the Convolvulus family and frequently bears seed. In 1901 a large number of plants were raised from seed at the Penal Establishment at St. Helena, and the result was very satisfactory, a totally new variety being produced.

The third method is to raise early plants from tubers planted in a hot-bed, and the procedure is as follows:—

Select a small piece of well-drained land, sheltered from southerly and westerly winds. There dig a ditch or trench 3 or 4 ft. wide, 1 ft. deep, and as long as is required, taking into consideration that a square yard of it will give you probably 1,000 shoots for transplanting. Now. build over the ditch a sort of box, about 1 ft. high on the north side and 18 in. on the southern, and close in the ends. Then shovel up the excavated earth against it. Make a framework cover, and nail calico to it. The next thing is to get a quantity of stable manure, and mix it well with about the same quantity of straw chaff. This avoids excessive heat and maintains a warm temperature. Shovel this into your ditch and box, and trample it well down. Give a good watering with a watering can, to every 6-in. layer, up to 20 in., and water again. Over this, put a couple of inches of light soil, and on it spread evenly the middle-sized and even small tubers, leaving only ½ to 1 in. space between them (there will be from 100 to 150 tubers to the square yard). Cover them with 2 or 3 in. of light, sandy loam, shut the lid, and await results.

The warmth of the hot-bed will have wakened up the germinating powers of the tubers and kept them growing and sending out numerous young shoots. September is early enough on the South coast to plant these out, as they will, by then, have attained a length of from 8 to 12 in. They should not be pulled or broken off close to the tubers, but if cut a couple of inches underground the part left in the soil will continue to grow and produce other shoots in a very short time. On an average, each tuber will give four shoots, so that transplanting can go on well into December. When planting, the side leaves and branchlets should be stripped off, leaving only a few leaves on the top end.

A few days after planting a certain amount of cultivation is needed to keep down the weeds, using a Planet Junior scarifier. For the removal of weeds close to the rows of plants, the hand Planet Junior hoe is the best implement to use. It will not be long before the vines will completely cover the soil, and in three months the whole field will present a dense mass of green. No further work is needed till the autumn, when harvesting the crop may be begun. The yield of tubers in a favourable season, and given the proper soil, is frequently 20 tons. At St. Helena in 1897 a record crop of 35 tons per acre on 6 acres was officially recorded. The Superintendent's report was to the effect that roughly 155½ tons were sold at £4 15s. per ton, giving a return of £738 12s. 6d.; besides which, 38 tons were used for domestic purposes, valued, at the same price, at £180 10s., making a total of £919 2s. 6d. Portion of the crop brought £6 10s. per ton, so that, had the produce of the 6 acres been sold at that price, the value of the 210 tons would have been £1,365. The largest tuber weighed 34 lb., and no note was taken of the small unsaleable potatoes which were fed to stock, nor of the quantity unavoidably left in the ground after digging.

It should be noted that no manure was used on the land, which had been cropped for several years previously with sugar-cane. In addition to the crop of tubers, cattle and swine were fed on the vines for several weeks. It will thus be seen that, given a good season, and a good red volcanic soil, not too heavy in texture, the sweet potato will yield a return which, at the normal price of £2 10s. per ton, exceeds in money value any other ordinary farm crop, except perhaps coffee.

TO ASCERTAIN THE RIPENESS OF THE TUBER.

When the sweet potato is ripe the sap has reached what may be termed the crystallisable stage—*i.e.*, when the tuber is cut or broken and exposed to the air, a white crust, or artificial skin, is formed over the cut part, and protects it from the air and from the agencies of decay. If the tuber is not ripe, the cut part turns black and no such artificial skin is formed. If, therefore, proper judgment is exercised as to the time and manner of digging, handling, and storing, there is little danger of loss.

HARVESTING.

When the tubers are ready for harvesting, which should be before the first frosts set in, say, June, the digging should only be done in dry weather. The first thing to do is to cut away the vines with a sickle or scythe, when the roots may be lifted with a digging fork or a specially adapted plough, which is so constructed as to prevent the tubers falling back into the furrows. If digging with a mattock or a double-pronged hoe, dig on one side of the row till the tubers are well exposed. Then pull out the whole of them, which, in the White Maltese (the best variety to grow, by the way) hang like a bunch of carrots all round the collar of the plant. Shake off what little earth adheres to them before bagging or storing. The crop may also be lifted by the use of a strong two-horse plough passing under the tubers, a horse walking on each side of the row. The best variety, the White Maltese, is recommended on account of its white, mealy, and savoury flesh. Another good point is, that the tubers, being elongated, sink deep into the ground, which enables the plants to stand a good long spell of dry weather. The next best is the Rosella. This is a sweet but not mealy variety, and one objection to it is that the largest tubers often grow a few feet away from the main crown, to which they are united by a very thin root, whilst small tubers grow promiscuously here and there, and all are liable to be injured by implements when being dug.

When there is an extra exuberance of vines, it often occurs that no tubers, or at most only a few, will form. Also the class of soil has much to do with the non-tubering trouble. A very common cause is the want of care in selecting cuttings from the most fruitful vines. It is a well-known fact that a cutting will, in almost any case, reproduce the peculiarities of the parent plant; therefore, it stands to reason that a crop of tubers cannot be expected from an unfruitful parent. The class of soil has also much to do with non-setting of tubers. When a soil which, when newly broken up, has produced a good crop, the result after a few years is, that it becomes closer in texture, and the crop will consist almost entirely of vines. The remedy for this we have shown above.

STORING THE TUBERS.

In the first place, the tubers must be thoroughly ripe. We have already shown how to ascertain the ripeness. After digging, spread the tubers out, either in the field if the weather is favourable, or in the barn, for a few days, to cure. Then lay down a thick layer of sand, on which place a layer of tubers. Then pour sand over them till they are completely covered, and every crevice filled. Next, put down a second layer of tubers on the sand, pour sand over these, and continue the process till the tubers are all put away. The sand excludes the air and the tubers are safe and will keep, in ordinary weather, right through the winter. Cover with straw or bush hay.

LIABILITY TO DISEASE.

The sweet potato is liable to disease, like most plants, and to the attacks of insect pests, which affect both vines and tubers. The worst pest in Queensland is the sweet potato weevil, which was discovered first in 1886. How it arrived here is not known, but it eventually spread from Brisbane to all the farming districts in the South-east, and finally reached all the coastal sugar districts to the far North, destroying both vines and tubers, the latter being pierced with holes, and traversed through and through with brown tunnellings, and more or less completely destroyed. The only certain remedy appears to be the complete destruction of the whole crop, and other crops planted instead. It is, however, probable that the raising of vines from young tubers brought from another part of the State may prove a remedy.

SEED MAIZE FOR DISPOSAL, 1916-17.

Owing to the need which has existed throughout this State in the various maize-growing districts for pure varieties of seed maize, this Department has taken up the subject with the object of improving what has hitherto been the main cereal crop of Queensland.

Owing, however, to the very questionable quality and variety of seed which is too often used by the grower, the average yield per acre in normal seasons is much below that which might be expected when our magnificent soils and climate are taken into consideration.

This Department has pursued a policy of importing seed of a number of the best varieties of maize from the United States of America and Southern States of the Commonwealth, and, with the object of effecting a further improvement in the varieties which have adapted themselves to Queensland conditions, a rigid system of selection has been consistently carried out, in order that the growers of Queensland may be able to obtain the best type of seed from these particular sources.

The Department now offers limited quantities of the varieties enumerated, on the following terms:—

> Orders should be addressed direct to the Under Secretary for Agriculture, Brisbane, and be accompanied by a remittance (exchange added). Price, 8s. per bushel f.o.b. Roma Street.
>
> Only one variety will be supplied to any one applicant.
>
> The quantity will be limited to 2 bushels (in order that as many growers as possible may be benefited by this distribution). Orders will be filled according to priority.
>
> In the event of orders exceeding the available supply of a particular variety, the right of substituting another is reserved. If this arrangement is not acceptable, notification to the effect should be made when ordering.

Five varieties, from amongst those tried, have been chosen, viz.:—"Improved Yellow Dent," "Hiawatha Yellow Dent," "Reid's Yellow Dent," "Boone County White," "Iowa Goldmine."

Improved Yellow Dent.—The improvement of this variety has been taken in hand in New South Wales, and the grain offered for sale has

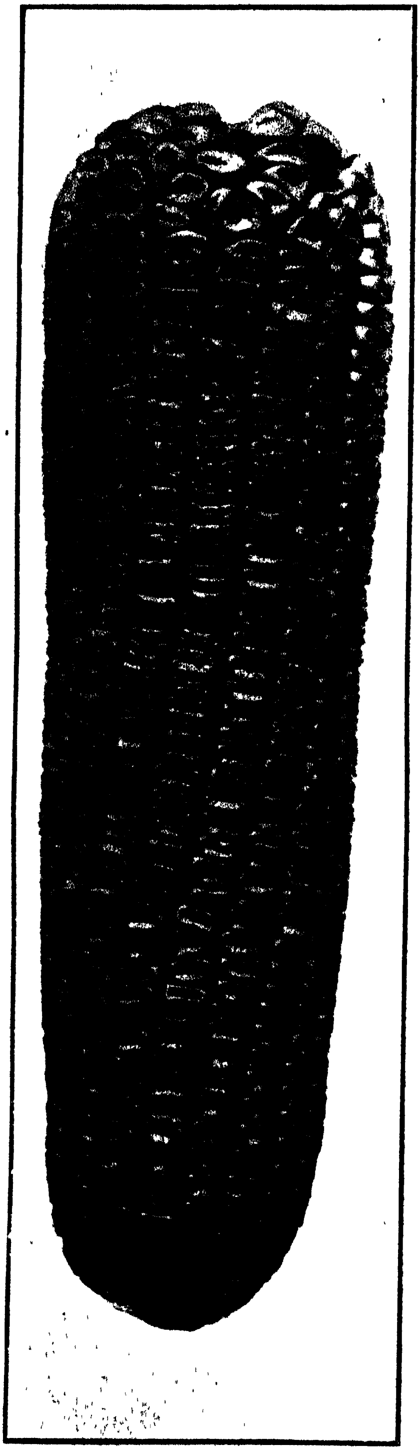
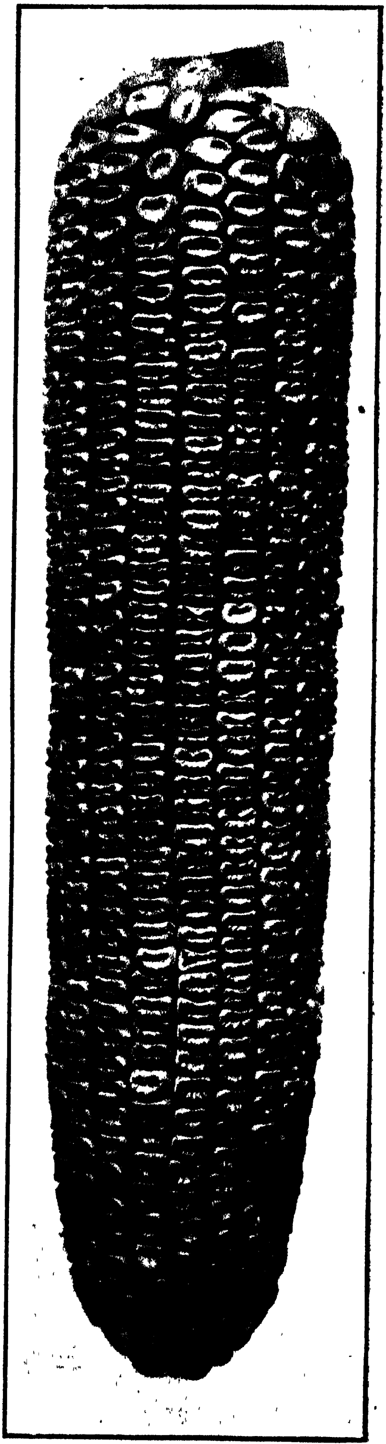


Plate 4.—I.Y.D.-2.—Improved Yellow Dent.



Hiawatha Yellow Dent.

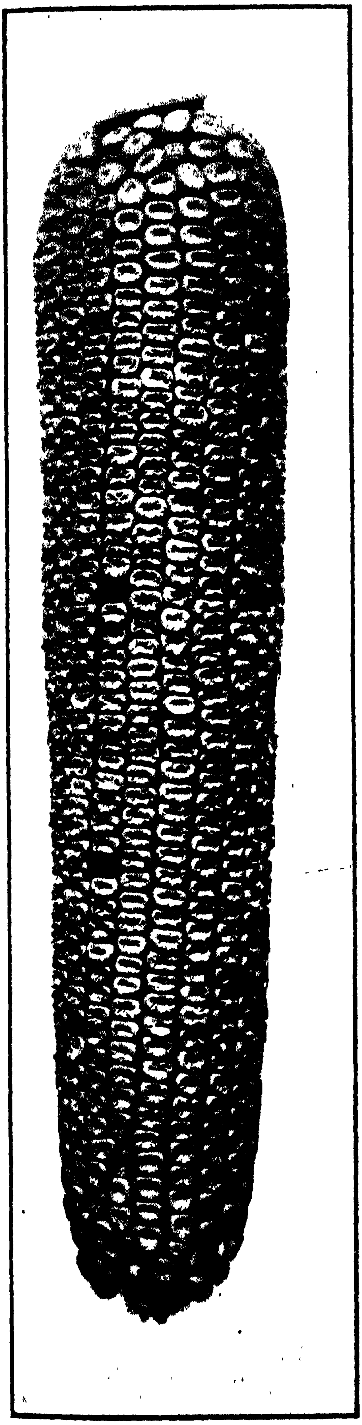
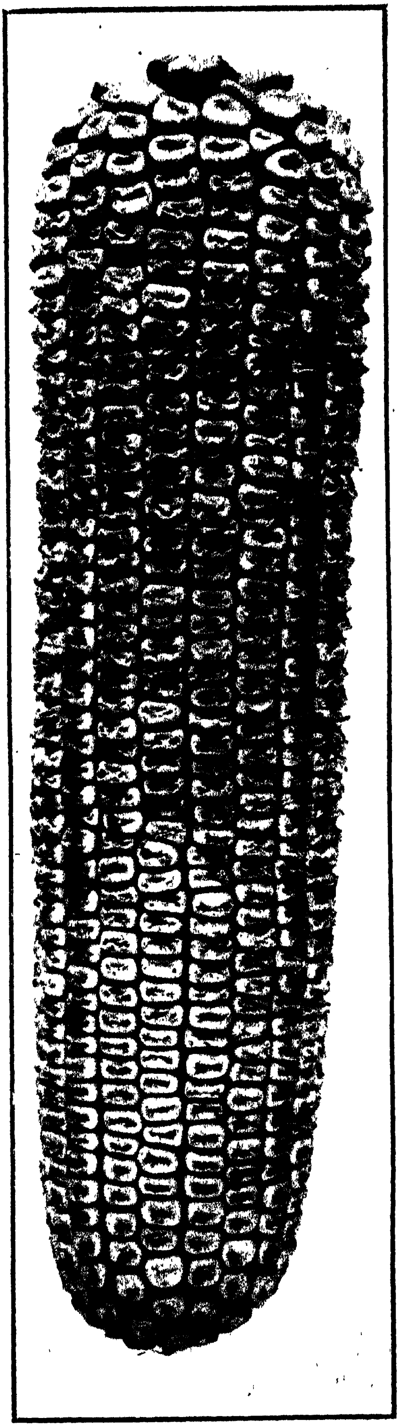


PLATE 5.—R.-8.—REID'S YELLOW DENT.



BOONE COUNTY WHITE.

been procured from selected seed obtained from the New South Wales Department of Agriculture. This variety has been experimented with in the ear-to-row tests, and has given very satisfactory results. It is a fairly tall-growing maize averaging 10 feet, stem straight and moderately stout, cobs of medium length, fairly compact, and cylindrical in shape, with rather blunt apex; eighteen to twenty rows. Grain flat, wedge-shaped, of moderate depth, slightly rounded at shoulder, showing a slightly ragged dent. Colour of kernels, characteristic yellow with pale yellow tip. Kernal shows a large proportion of horny starch, and is firm in texture. Time of maturity, approximately, five months.

Hiawatha Yellow Dent.—This is a variety credited as originating in Illinois, U.S.A., twenty-five years ago, and pure seed was imported into this State three years ago. It is a strong, vigorous grower, taking from five to five and a-half months to mature; is a prolific yielder where rainfall is good and the soil rich. Ears are long and borne on a lengthy shank, which bends over as the ears reach maturity. Grain is flat, wedge-shaped, and square shouldered, somewhat tightly packed on the ear; it is even in size, carrying a shingle dent, horny coloured with light yellow tip. Core small in proportion to size of ear and pink in colour; eighteen to twenty rows. This season the grain is smaller than usual owing to indifferent growing conditions.

Reid's Yellow Dent.—A medium early maturing variety (three and a-half to four months), plants averaging 9 feet in height. This is a prolific bearer, although inclined to sucker on rich soil; ears are long and cylindrical, the grain being packed with a characteristic tightness on the ear, which shows conclusively the great improvement effected by consistent selection. Reid's Yellow Dent readily adapts itself to new conditions, and is useful where early crops are desired. Grain is somewhat small in size, wedge-shaped, and regular and uniform in type and kind of dent. It carries a fair proportion of horny starch and shows a pale yellow tip, the general character partaking somewhat of the Early Leaming type; eighteen to twenty rows. Core red.

Boone County White.—One of the best of the white varieties. This is a medium late maturing maize of a hard nature, taking from four and a-half to five months to mature. It yields good crops on rich heavy soil, for which it seems particularly adapted. Grain is medium-sized and rectangular-wedge-shaped, amber-white in colour, with clearly defined white cap, pinch dented. Ears sixteen to twenty-two rows, core white. This is a favourite variety for coastal districts. Owing to unfavourable climatic conditions the grain is somewhat shorter this season than is usually the case.

Iowa Goldmine Maize.—This variety was imported from the United States of America in 1915, where it has shown good returns amongst the corns of its class.

A quick maturing, four months' variety, adaptable to light soils, particularly useful in localities where early sowings are made. The plant grows from 6 to 7½ ft. high, of early flowering habit, the ear borne on a somewhat long shank having the habit of turning down as it approaches maturity. The ear is usually well furnished at both ends from 7 to 8 in. in length, having from 14 to 16 well-packed rows of grain The grain is of a square-shouldered wedge-shaped type, inclined to be small as is the case of most early varieties, and golden in colour with a characteristic "Crease" dent.

THE VALUE OF SOIL EXPLOSIVES.

We have on several occasions published articles on the value of soil explosions in breaking up hard subsoils in citrus and other fruit plantations, but we have only in one instance heard of any improvement in the growth and health of the trees due to this method—rather the reverse. For instance, a piece of land was treated on a farm near Brisbane. The adjoining block was worked in the ordinary way. Six months later, no difference was to be noticed between the crops on the two blocks. For clearing land of trees and stumps, explosives are undoubtedly of great value, effecting a considerable saving in the matter of labour.

It will be interesting to review the experiences of other countries. In the "Agricultural News" of Barbados, of 11th March, 1916 (Vol. XV., No. 362), will be found an editorial dealing with the subject as far as regards the dynamiting of orchards and sugar plantations, and showing the results of practical experiments that have been made, especially in the West Indies. Useful trials have been made by the Agricultural Departments in Dominica, Trinidad, and Antigua.

The "Agricultural News" wrote on the date abovementioned—

In one of the plots in the additional series of experiments in lime cultivation in Dominica, charges of dynamite were exploded in fifty-six holes between the young trees; but after the elapse of many months, no improvement could be observed in the condition of the trees. On another portion of the field, trees in a similar condition were treated in the same way, but after twelve months' time no improvement was observable. Judging from these and other experiments carried out by planters, no good effects can be discerned from the explosion of dynamite in lime cultivation. There may, however, be certain conditions, such as the close proximity of hard-pan to the surface, under which the use of explosives may be advantageous; but in a general way their use is not likely to be beneficial. One other experiment was tried in Dominica. When planting the plots, holes were made by dynamiting with a view to compare their efficiency for plants with those made with the spade. Each alternative row of holes was dynamited and the remainder were dug soon after. The holes were carefully filled in a few days before planting to allow time for sinking, and six months after preparation, planting was done. So far the plants growing in the differently prepared holes exhibit very little difference in appearance.

Turning to the experiments conducted by the Government in Trinidad, the recent Annual Report of the Department of Agriculture states that " dynamite experiments have been conducted on banana soil, and the figures obtained appear to show that not only a larger number of bunches has been reaped from the dynamited plot, but also that there has been a larger number of seven, eight, and nine-hand bunches, and consequently the average weight of the bunches from the dynamited plot is 20·4 lb. against 18·8 lb. from the undynamited plot. In regard to similar experiments with coconuts, both the dynamited and undynamited plots have made good growth. So far the undynamited plot is the better of the two.'' In these experiments also, therefore, the results are not, on the whole, satisfactory.

In Antigua, trials have been conducted with sugar-cane. In these experiments, which were carried out on Delaps and Donovan's Estates, dynamite cartridges 2 oz. in weight were used, and were exploded 2 ft. 6 in. below the soil. Plant and ratoon canes were experimented with in each case. On the first-named estate, the variety of cane treated was White Transparent. The results obtained both in the case of plant and ratoon canes have indicated that dynamiting the fields under soil conditions such as obtain at Delaps is not productive of profit. The returns obtained from the controls and dynamite plots showed little divergence. At Donovan's Estate, slightly different results were obtained. Here, also, there was no gain obtained by dynamiting plant canes, and, as a matter of fact, the not-dynamited plot gave a higher yield; but with the ratoon canes there was a very appreciable increase in the case of the dynamited plot, which may, at least in part, be put down to the effects of the explosions. The soil at Donovan's Estate is especially heavy with a clay subsoil, and a reason for the increased yield from the ratoons may be found in the action of the dynamite in opening up the subsoil. In these last-mentioned experiments, the dynamited plot gave a yield of cane per acres of approximately 11 tons compared with 4 tons from the not-dynamited. The area of each plot was about ⅞-acre. But the extremely meagre return of 4 tons per acre shows that the soil conditions of the plot must have been exceptionally bad, and the results obtained therefore with dynamite in this experiment cannot be regarded as at all general in their application to the dynamiting of soil growing ratoon canes.

Taking a general view of the West Indian results, it would appear that the benefit that may be expected from the use of dynamite is more imaginary than real. As with manuring, so with soil explosions, the conditions obtaining in each case must be considered. It is probable that for breaking up the subsoil, and for removing a hard-pan, the use of explosives is worth while; but as a general operation in the routine of plantation management, it is not to be recommended on the basis of present experience.

Where it is intended to employ explosives, the object arrived at should be clear and definite. Otherwise more harm than good may result. One direction in which dynamite might possibly be used to advantage in the West Indies is in breaking up the large boulders of larva that occur in the fields in some of the islands. The removal of such obstructions in the places referred to would facilitate ploughing and cultivation generally.

In the issue of the ''Agricultural News'' for April, the subject of the value of soil explosions is again touched upon, and in connection with experiments carried out in Kansas, U.S.A. From the following extract from the Kansas Experiment Station Bulletin No. 209, "it will be seen that very little benefit was derived from the use of explosives, the general results being in close agreement with those obtained in the West Indies. All available evidence goes to show that there is, in the ordinary way, no advantage in using soil explosives."

A series of experiments was planned to determine the effects of dynamiting on soil, the yield of crops, the moisture content of the soil, nitrate development, the bacterial flora, the physical condition of the soil, the leaching of salts in alkali soil, and the growth and vitality of fruit trees.

The crop planted on dynamited soil produced a higher yield in seven instances, while the crop planted on undynamited soil produced a higher yield in four instances. The greatest increase in yield on dynamited soil was obtained at this station with corn in 1914, when the dynamited plots produced 13 per cent. more grain than the undynamited plots. At Agra the dynamited plots produced 17 per cent. less wheat than the undynamited. In most instances the difference in yield was no greater than would occur on two areas of soil similarly treated.

Moisture determination on a series of nine dynamited and four undynamited plots on the Oswego Silt Loam at Manhattan, extending over a period of three years, showed no marked difference in moisture content of the soil. An average of all the determinations gave less than one-half of 1 per cent. more moisture in the dynamited than in the undynamited land.

Nitrate determinations on the same plots extending over the same length of time showed no greater formation of nitrates on dynamited than on undynamited soil.

A count of the number of bacteria at different distances from the centre of a dynamited area two years after the dynamiting was done showed a small increase in bacterial content in both the surface and second foot of soil as the dynamited area was approached.

A study of the effect of dynamite on the physical condition of heavy, plastic clay soil showed that the explosion forced out the soil particles at the centre of the dynamite charge into the pore spaces of the soil mass adjoining, thus producing a cavity surrounded by a hard, compact mass. The soil, instead of being shattered and cracked, was compacted and puddled, and left in poorer physical condition than before the dynamiting was done.

An alkali soil in the Arkansas River Valley dynamited in the early spring of 1912 with half-sticks of dynamite placed 2½ ft. deep at the corners of 15-ft. squares had not been noticeably improved by the fall of 1914. However, there had been some leaching of the salts from the surrounding soil.

Fruit trees planted on dynamited soil at this station in the spring of 1911 made a slower growth and survived in smaller numbers during the dry seasons following than did trees planted on similar adjoining soil that had not been dynamited.

In no instance was there improvement sufficient to pay expense of dynamiting.

OIL SEEDS WHICH MAY BE PROFITABLY GROWN IN QUEENSLAND.

SUNFLOWER SEED.

The seed of the sunflower is rich in oil content and is well worth growing for commercial purposes. There are several varieties of the plant, but we need only consider the particular variety which is the most profitable as a seed-producer. This is the Giant Russian, whose large heads contain from 1,000 to 2,000 seeds. The plant attains a height of from 6 to 12 feet, and the heads are often from 15 to 18 inches in diameter. Such heads will produce 3,000 seeds. The latter are sometimes black, sometimes light grey streaked with black. They are closely packed together in the head. The plant is easily grown in all parts of Queensland. It will bear heat, cold, drought or rain, and is subject to no disease.

SOIL AND CULTIVATION.

Although the plant is not very particular as to soil, it thrives best in a deep, well-drained loam. It is advisable to sow early, say beginning in September and ending in February. The quantity of seed required per acre is from 15 to 20 lb. if sown broadcast, but only half that quantity is needed if sown with a seed drill. The drills should be 5 feet apart, and the plants 3 feet apart in the rows. The tall-growing Russian Mammoth, which produces only one head per plant, may be planted closer, the rows being about 3 feet apart, and the plants from 10 to 18 inches in the rows. Planted at these distances, the yield may be set down at from 40 to 50 bushels per acre.

One of the advantages of sowing sunflowers is, that the crop may be harvested three months after sowing the seed. The cultivation consists in keeping the land clean, and the soil in fine tilth to enable it to retain moisture. This is a very important point, because the plant absorbs and evaporates large quantities of moisture. When full grown, it will evaporate from 1 to 2 lb. of water in twenty-four hours. When the plants have attained a height of from 12 to 18 inches they should be earthed up. The yield, if good, should be about 1,600 lb., or 50 bushels, per acre.

Various uses are made of the seed; primarily for the extraction of the oil, which possesses drying qualities. The percentage of oil extracted from the Russian sunflower ranges from 35 to 50 per cent. of the total weight of the seed, but there is, in reality, a larger quantity, which is lost in the hulls.

When the seed heads are ripe, the plants should be cut down and carted to the barn or drying shed, where they should be dried as quickly as possible to prevent the formation of mouldiness on their fleshy parts and on the seeds. When thoroughly dry, they are threshed with a flail and the seeds are then winnowed and bagged.

We need not describe the process of extraction of the oil, as that is not the farmer's business. All he has to do is grow and prepare the seed for market. A few years ago, when there was no war to limit production, enormous quantities of sunflower seed were exported from

Russia, Germany, and Hungary, the price ranging from £10 to £12 per ton. Cotton seed then was worth from £4 to £6; to-day it is worth £11 to £14; castor oil seed £16; and oil seeds generally have risen in price We cannot say what is the present value of sunflower seeds; the yield of about 15 cwt. per acre is probably worth £12 to £15. Vast quantities of sunflowers are grown in Russia and other European countries, both for oil, oil-cake, poultry food, and for human consumption, for which latter purpose they are roasted like coffee-beans or pea-nuts, and are sold at fairs on feast days and holy days under the name of "Sèmotchky." Pigs also thrive on the seeds, and the stems are used in treeless districts for fuel. A valuable fibre is obtained from the stems, and the leaves are relished by stock, and can be converted into ensilage and hay.

The sunflower is grand bee food; at least, the bees think so, for as soon as the heads come into blossom scores of the busy workers may be seen occupied in loading their little thigh baskets with pollen, and filling their tiny stomachs with the sweet nectar to turn the spoils into bee-bread, honey, or wax. It may be added that the ash of the stalks is rich in potash, which in Northern Europe is carefully collected and sold. Such ashes, needless to say, form a valuable manure for plants requiring potash.

With the constantly increasing demand for the seed for home consumption and the exigencies of the war, a decline in the exports of oil seeds from Russia may be looked for not only for the duration of the war, but subsequently; hence prices must increase with the diminution of supplies.

CASTOR OIL.

As most Queenslanders know, the castor oil plant is so hardy that it may be seen growing luxuriantly in all sorts of soils and in any situation. It has, in fact, become a weed both in country and town districts. As a weed it is studiously eradicated, but were it looked upon and treated as a valuable source of lubricating oil, a payable industry might be added to the agricultural resources of the State. The plant revels in dry soils, to which it imparts great fertility instead of exhausting it.

The seeds should be planted in rows 6 feet apart and 4 feet between the plants in the rows, and before sowing they should be steeped in hot water for twenty-four hours. After the plants are above ground the cultivation is the same as for corn, cotton, sunflower, tobacco, &c.

When the seed pods are ripe they suddenly burst open, and scatter the seeds in all directions. Special arrangements must, therefore, be made for harvesting them. When the pods are seen to be turning brown, the spikes which bear them are cut off, and taken to a clean-swept piece of hard ground, which may be enclosed with galvanised iron set up lengthwise. Here they remain, being turned occasionally until the pods have emptied themselves. The husks are then removed by winnowing, and the beans swept up and bagged. They must on no account be allowed to get wet, although when growing wild the fallen seeds spring up in numbers, notwithstanding that they may have been exposed to heavy rains. The harvesting of this crop is so simple and easy that it may be done by young people.

EXTRACTION OF THE OIL.

As in the case of other oil seeds, the grower need not start an oil mill in order to market his crop. The seed is readily saleable as soon as winnowed and bagged. A simple mill consists of two large round stones, identical with the wheat-grinding mills of by-gone days, connected by a spindle, which are revolved by horse-power in a hollowed-out stone, in which the beans are placed. These stone mills hold about 2 cwt., and this quantity is crushed every half-hour. The oil is then poured into filtering bags, and the pure oil runs from the shelves on which the bags are placed, through tubes, into vessels placed to receive it. The yield of oil varies from 40 to 60 per cent., but the usual average is 40 per cent. The oil-cake makes an excellent manure.

The usual price for crude lubricating castor oil in pre-war times was from 2s. 9d. to 3s. per gallon, at which price, reckoning only 1,000 lb. of seed as the produce of 1 acre, the return would be £7 10s., 1,000 lb. of seed yielding 50 gallons of oil. Latterly (1916) the price of the crude oil has nearly doubled. The seed sells at about 4d. per lb.

CANAIGRE.

Canaigre is a tuberous-rooted plant much used in the past as a tanning material. It goes also by the names of "red dock," "tanner's dock," and "wild rhubarb." It is propagated by planting the small tubers and also by seed. About 1,000 lb. of tubers will plant one acre. It may be cultivated on arid soils, as it requires very little moisture. It cannot be injured either by heat, cold, wind, disease, or insects, although, as regards cold, very heavy frosts are injurious to the plant. The best season for planting in Queensland is from April to May. The tubers are set in rows 2 ft. apart, the plants in the row being 12 in. apart. The tubers rapidly increase in size, and form a cluster like sweet potatoes, growing very near the surface, and sometimes on the top of the ground. The yield ranges from 6 to 10 tons of tubers per acre. When ripe, they are sliced and rapidly dried. They contain up to 48 per cent. of tannic acid, the average being about 30 per cent. Two and a-half tons of dried roots will make 1 ton of extract, worth £12 to £14 per ton; 3 tons of fresh roots make 1 ton of dried.

As a tanning material it is very valuable. For light leather it is superior to oak, gambier, or hemlock. It is a quick tanner, and the yellow colour absorbed by the hide in the process of tanning is considered highly desirable for certain leathers. The plant thrives in Queensland and has been successfully grown at the State farms some years ago.

COTTON NOTES.

With cotton in the neighbourhood of 9d. per lb. in the British market for " Middling," and the unfavourable weather conditions over a large area of the U.S.A cotton belt, the prognostication of many cotton men of dearer cotton has proved correct. The continued dry weather has caused much damage, and after the spring sowing, the outlook, especially in the State of Georgia, was described as serious. It is also noteworthy that in the American cotton industry wages are higher than at any previous time, thereby increasing the cost of production, and " Cotton," the official journal of the Manchester Cotton Association, Limited, indicates that " it is probable that America will have her troubles when she seeks to bring about any reduction. In the local cotton industry the Government authorities have intervened in the wages dispute, and an optimistic view was taken that the difficulties will be smoothed over."

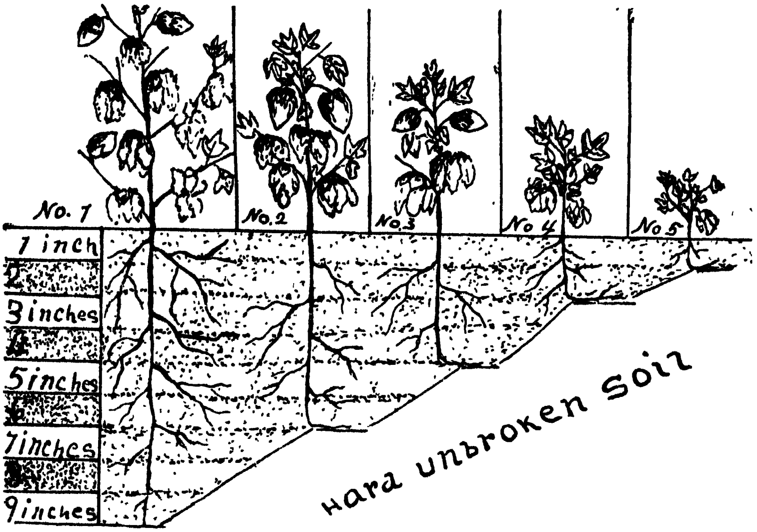
The same journal says that it is imperative that a crop of 14,250,000 bales be grown unless there is to be a dearth of the raw material. One authority places the probabilities of the coming crop, on an acreage of 35,000,000, at 14,500,000 bales maximum, 12,250,000 bales minimum. The start made over the greater part of the belt has not been encouraging, and it has yet ahead all its troubles. The outlook at the time of writing was not bright for a maximum yield. To-day Queensland has a splendid opportunity to enter the field of cotton production, not by way of experiment, seeing that years ago the crop had passed the experimental stage. How often shall we repeat that the plant thrives and bears heavy crops from South to North and out to the far West of the State? How often are we to point out that whilst cotton fields in America are devastated by two terrible pests—the boll weevil and the cotton stainer—nothing of the kind has ever appeared in this State? Everything is in our favour. Labour in the United States is quite as expensive as in Australia, consequently it costs no more to grow and harvest a crop in Queensland than it does in Cousin Jonathan's Land. The Queensland Agricultural Department is doing all that is possible to once more place Queensland on the list of cotton-producing countries. The most valuable seed is being imported for September sowing, at no cost to the farmer; an advance of 1¾d. per lb. is offered to the grower for all the cotton he can produce, and he will have the whole profit, after all expenses have been paid, which his crop will realise. Finally, cotton is a plant which does not demand much moisture, as the deep running tap root draws up a good supply from the subsoil, consequently the grower can be fairly certain of a crop at times when ordinary farm crops fail.

COTTON PLANTING.

As the season for cotton planting in the Southern districts will begin at the end of August, a few hints to intending growers will probably be acceptable.

In the July issue of the Journal we described several varieties of cotton, seed of some of which has been ordered by the Department of Agriculture and Stock, to be shipped from the United States of America in time to arrive here in August or September. These cottons are very highly spoken of in America, and should do well in this State, where climatic conditions and the absence of the pernicious boll weevil, the cotton-stainer, and the leaf-eating worm, are more favourable than some of the Southern States of the U.S.A. Of fungoid diseases occurring in old-established fields in other parts of the world we have none.

With regard to the preparation of the soil, many farmers who have grown cotton in Queensland failed in this, first, because they did not turn over their land as soon as the crop was harvested; and second, because they did not plough deep enough. Cotton is one of those typical tap-rooted plants made to go deep into the soil in search of water or plant food. Aside from the taproot going deep below the surface in well-prepared ground, it throws out numerous laterals, often 4 to 5 ft. in length, the largest of which are, as a rule, just below the surface, hence after cultivation should be shallow (3 or 4 in.). In the preparation of the land, which should be taken in hand in the winter, the ploughing should extend to 9 in. in depth, thus increasing the water-holding capacity of the soil, greatly reducing injurious washing, helping to mix the latter by quickly softening the more friable portion and allowing it to percolate into the cracks made by the ploughing process. All preparation or tillage should be done when the soil crumbles the easiest, and does not ball up into a sticky mass when pressed in the hand. The accompanying cut requires no explanation, showing clearly, as it does, the splendid root growth of the plant on the deeply-ploughed land, and the decrease in vigour in the shallow soil, where the root strikes the hard ground.



The sum of our advice to cotton-growers is: correct preparation of soil, selection of good seed, proper fertilisation (if necessary), planting at proper distances apart of the plants, and tillage. It may be added that the boll worm may be controlled by planting trap crops of maize. The worm is found in the heads of maize cobs, and as it has a decided preference for maize, the cotton planter has a means whereby he may protect the cotton bolls from injury by planting corn between the rows of cotton. Cowpeas are equally effective. The system of maize traps crops is to leave five rows vacant between every twenty-five rows of cotton. Plant one row as soon as possible with early-maturing corn. When the silk appears, search for the eggs of the moth, and when no more eggs are visible cut the whole plant down and burn or feed it to stock. Now plant three more rows of corn, or alternate the corn with cowpeas. The peas should come into full bloom when the corn has appeared above ground. The three rows of corn should be silking about December. On the ears of these corn plants will be found a large number of eggs. These must not be destroyed, but allowed to mature in order to prevent the destruction of the natural enemies which are parasites on the eggs and worms. The crowded condition of the worms on these ears induces cannibalism to such an extent that few reach maturity. *No destruction of these ears is recommended until the whole generation is parasited.* Now, the fifth and last row of maize is planted to catch the eggs of the remaining few which have matured, and these are destroyed by burning the ear silk as soon as laying has apparently ceased. If this plan, a very simple one, is adopted, it will be found that out of fifteen to thirty young larvæ, which may usually be found in a recently silked ear of corn, but one or two boll-worms will eventually reach maturity.

One great mistake which has been made with maize trap crops is, planting the corn at the usual time in spring, with the result that the cotton has suffered greater injury than would otherwise have occurred. The success of the trap crop idea depends entirely on *having the corn in tassel about December*, and it must be planted considerably later than the normal time of planting in spring.

A NEW SYSTEM OF COTTON CULTIVATION.

The system which is here described and recommended has been successfully tested in several localities of the United States, both by the Bureau of Plant Industry of the Department of Agriculture and by practical farmers.

The way to secure an early short-season crop of cotton is to thin the plants later and leave them closer together in the rows than is now customary. Neither of these policies is advisable if used alone, but they give a real advantage when properly combined. Keeping the plants closer together during the early stages of growth restricts the formation of vegetative branches and induces an earlier development of fruiting branches.

The spacing of the plants and stages at which thinning should be done will depend upon local conditions and will have to be determined experimentally in every case.

So long as the plants are close together they do not form vegetative branches; hence by thinning them when the stalks have grown beyond the stage in which vegetative branches are produced, the latter are controlled or suppressed. This makes it possible to leave more plants in the rows than is now customary and yet avoid injurious crowding.

The control or suppression of the vegetative branches also permits an earlier development of fruiting branches and leads to the production of an earlier crop. In regions where the period of crop production is limited either by short seasons or by the presence of the boll weevil, increased earliness is a means of securing larger yields. Hitherto no other way has been suggested whereby it is possible for the farmer to gain such direct control of the behaviour of his crop and to ensure larger yields in short seasons. The danger of weevil injury is greatest under conditions that favour the luxuriant growth of the young plants and induce the formation of large numbers of vegetative sterile branches, and it is under such conditions that the control of the formation of branches becomes most effective as a method of weevil resistance.

The boll weevil, as stated above, has never made its appearance in Queensland. We have the boll worm, which is easily controlled by trap crops of maize.

SOWING THE SEED.

The Uplands cotton, in the Southern and Central Districts of the State, succeeds best in rows from 3 to 4 ft. apart, the plants being from 18 in. to 2 ft. apart in the rows on light, sandy soils, and 4-ft. rows with 2 ft. between the plants on richer land. Under the new system, however, which has not yet, we believe, been tried in Queensland, the plants may, with advantage, be grown much closer together.

The best time to sow in the South is from the latter end of August to October. November is rather late, but full crops have been gathered from November sowings, principally in districts where frosts only occur late in June or July. Picking will begin, for early-sown cotton, about January or February; and for November sowing about March or April, and will continue until the frosts of July and August cut down the plant. Five pound per acre is ample for seeding, with three seeds in a hole. The maize planter is fairly successful in sowing cotton seed in America. In clearing out the drills, previously indicated by a marker, they should not be deeper than 3 in. The seeds then having been dropped by hand or by the seed drill should be covered with a light harrow.

In about four or five days after sowing, the young plants will appear, and may be thinned out, if sown thickly, when the third leaf has appeared. When the remaining plants have reached a height of 12 in., a further thinning will be necessary, only three plants being left, and when these attain to 18 in. two may be withdrawn, the third being now able to hold its own against insect attack. The usual after cultivation (shallow) may now be carried on.

The plants will begin to flower in about two months after thinning, and if good fortune has attended the grower in the way of absence of pests in the shape of the boll worm and cotton bug, he will now have reached the most pleasing period of the work connected with the crop—

COTTON PICKING.

Unlike the harvesting and preparation for market of wheat, maize, lucerne, and other grasses, coffee, rice, &c., there is no labour connected with the cotton harvest beyond picking and bagging for transport to the

Government or any private ginnery which may be in existence next season. The average picker in a good crop can pick from 150 lb. to 200 lb. per day between 10 a.m. and 5 p.m. Experienced pickers, including boys and girls, have far exceeded this quantity. The price paid for the work is ½d. per lb., which means from 12s. 6d. to 8s. 4d. per day of six hours. This is the standard pay for white pickers in America. The work is not at all laborious.

The average yield of an Uplands cotton crop can scarcely be stated. It ranges from 1,000 to 2,000 lb. per acre, and even more has been obtained in Queensland. (*See* "Cotton Cultivation in Queensland" (page 19), issued by the Department of Agriculture and Stock.)

SOME USES OF PRICKLY-PEAR.

The Director of Agriculture, Madras, has issued in the form of a departmental leaflet the following note on some uses of prickly-pear:—

The prickly-pear plant is considered by many ryots as a curse to the country, as it has overrun immense areas in several villages. In some places much agricultural land has been rendered temporarily useless from having been taken possession of by this troublesome pest. In very many villages the scrub jungles are overgrown with it and the land which would have otherwise been useful for growth of trees and grasses is occupied by it. It forms a safe refuge for snakes, &c. By the spread of this plant several public thoroughfares are becoming narrower every year, whilst poramboke lands are not infrequently rendered useless thereby for any purpose. The ground close to these bushes is used as a public latrine by villagers, which encourages the growth of the plant and does not add to the amenities of the village. The eradication of prickly-pear in villages is therefore one of the serious problems with which ryots have to contend.

Although attempts are being made here and there by public bodies, such as taluk and district boards, to eradicate this plant in very congested areas, yet such work is only practicable on a large scale if ryots in all the villages assist in removing it.

In parts of Coimbatore district prickly-pear is used after decomposition and composting as a manure for dry land crops such as cumbu, cholam, dry ragi, and garden crops like ragi, chillies, tobacco, wheat, plantains, sugar-cane, &c. This is, however, not resorted to by all. In many cases it is prickly-pear growing in corners of their fields or extending from outside into the fields that is cleared and composted by way of disposal. A few ryots compost prickly-pear, especially when it is abundantly available near at hand; but this is not followed as much as it might be.

Ryots, however, have taken up to the practice of carting to their fields the earth which accumulates under prickly-pear bushes for improving their lands. In tank bunds and porambokes nothing is paid for the earth itself, and the cost is only two annas per cart-load (when the distance to be carted is about half-a-mile), for clearing the prickly-pear to get at the earth beneath, digging the earth, loading and carting it to the fields. The price per cart is becoming higher gradually owing to the increased wages. The soil under the prickly-pear bushes is of high manurial value as it is very largely composed of leaf mould and other organic matter blown in by the agency of wind. Prickly-pear itself contains more than 60 per cent. of organic matter (Dr. Leather's analysis), and if such a substance is composted with the rich soil found under these bushes the manurial value will certainly be enhanced. Many of our soils are deficient in organic matter, and if a compost of prickly-pear and the soil found under it is made and applied, the result will be beneficial. By composting prickly-pear, ryots not only obtain manure but get rid of this pest which is at present a nuisance in many respects.

The following methods may be adopted for composting:—

(1) A trench 3 ft. to 4 ft. deep and 6 ft. broad, of any required length, may be dug and kept ready during the interval between the first and second monsoons. During rainy days, when the ryots have not got busy work, prickly-pear may be cut, removed and filled in the trench and covered with soil that has been removed in digging it. The top of the trench will sink after some days owing to the decay of the stuff and at this stage the soil from under the removed bushes may be dug and thrown on the top. In places having good rainfall this will make a good compost within one year. If the thorns have not decomposed thoroughly, this may be left for another year, when the thorns also will decompose.

(2) In regions of scanty rainfall prickly-pear may be removed and heaped up in convenient mounds and allowed to dry up during season when ryots have enough leisure at their disposal. Dried bushes, grasses, and other rubbish procurable in the vicinity, may be spread over the heaps and set fire to. The thorny substance is partially burnt. At this stage the earth removed from under the bushes or from lands close by should be spread all over the heap, which can then be left for some years until decomposition is complete. In three or four years this will be fit for being carted to fields.

(3) If space is not available for the above, circular constructions similar to those used for grinding chunam should be made. The prickly-pear is then thrown into this pit and ground by a stone grinder just as chunam is ground. Owing to the large amount of water in the stems the plant, when the stuff is ground, is converted into a jelly-like substance within half an hour and the whole mass can be removed by mammuties and carried to places where compost is to be made. If this is filled in pits or covered with some earth, decomposition will easily set in. The thorns also will not stand erect but will lie flat and the nuisance they cause will be much reduced. In this case the manure will be ready within six to eight months.

Prickly-pear can also be used to serve other useful purposes than the one above referred to. The water obtained after boiling prickly-pear for some time can be used as a drier in white-washes. An ordinary pot or chatti is filled with prickly-pear cut into small pieces; as much water as the pot will hold is then added. The whole is boiled for about three hours and stirred during the process. When cool, the liquid is strained and added to separately prepared white or colour wash in the proportion of 1 to 150 or 160. Whitewash or colour wash treated in this way becomes fast and does not rub off easily. In Indian houses this fast colour is a great advantage as it does not soil the clothing or body when the newly white-washed walls are touched.—"Indian Trade Journal," 16th June.

LIME FOR FARMERS AND FRUIT-GROWERS.

As the Department is receiving numerous inquiries respecting the benefits to be derived from the application of lime to our soils, the following answers by the Director of Fruit Culture. given in response to questions submitted to that officer, may prove of interest to agriculturists generally:—

1. The suitability of pulverised limestone for agricultural purposes:—

Answer.—A good quality limestone, when reduced to a fine state of division, is one of the best if not the best form in which lime can be applied to the majority of soils, and its use has largely superseded that of burnt lime or air-slacked lime for agricultural purposes in many parts of the world.

2. The superiority or otherwise of pulverised limestone over burnt or slacked lime.

Answer.—Pulverised limestone has several advantages over burnt or slacked lime. In the first place, there is no danger of spontaneous combustion such as occurs when burnt lime comes in contact with water. Second, it can be carried in bags without injury, as it does not swell and burst the bags as burnt lime frequently does. Third, it has no caustic action, and it is much safer to handle, as it causes no injury to the hands, face, or eyes, which frequently occur when burnt lime is used. Fourth, pulverised limestone encourages bacterial action in the soil and promotes nitrification, whereas burnt lime retards these operations at first, although, eventually, an increased action is obtained. Slacked lime has a similar effect to burnt lime, only in a less degree, and it is only after the lapse of a considerable period that caustic lime eventually reverts to the form of carbonate of lime, as it first becomes converted into the hydrate form, and the hydrate finally is converted into carbonate of lime. In other words, when the burnt lime has become absolutely air-slacked by the process of time, it reverts to the original form of carbonate of lime in which it occurred in the stone prior to its being burnt, except that it is in a fine state of division instead of the rock form.

3. The amount (approximately) of both pulverised limestone and slacked lime per acre for (1) heavy loams, (2) light or sandy loams, (3) volcanic soil.

Answer.—As the majority of the soils of coastal Queensland, no matter whether of light or heavy nature, are deficient in lime, a dressing of not less than 10 cwt. per acre or, better still, a ton per acre of either pulverised limestone or thoroughly air-slacked lime should be applied.

4. The amount (approximately) per (1) young tree, (2) full-grown tree, (3) decadent tree.

Answer.—Given 100 trees per acre, if half a ton per acre is applied broadcast over the land, then this would work out at a trifle over eleven pounds (11 lb.) per tree, but if a ton per acre is applied, it will work out at a little over 22 lb. per tree. It is unnecessary to consider the question of applying so many pounds of lime to the individual tree, as in every instance the lime should be broadcasted over the whole orchard either by hand, or preferably by a manure distributer such as the "Wallace," which can, I believe, be obtained in New Zealand, and possibly in the Southern States.

5. The minimum percentage of lime in pulverised limestone.

Answer.—Pulverised limestone should be made from the limestone containing the largest percentage of carbonate of lime; a good limestone should contain from 90 to 99 per cent. of carbonate. Ground limestone, as previously mentioned, must be reduced to a fine state of division, as it is only when so reduced that it is available for plant use. The degree of fineness to which the limestone should be reduced should be such that the whole of the material will pass through a mesh containing not less than 40 divisions to the lineal inch; any material that will not pass through a mesh of this size being too coarse and will remain a comparatively long period in the soil before it will become available, the actual period depending, of course, on the coarseness of the particles—the larger or coarser the particles, the longer it will be before they become available. Therefore, for all practical purposes, I consider that any ground limestone that will not pass through a 40-mesh has very little if any value, at any rate for a considerable time after it has been applied, whereas the material which has passed through a 40-mesh is available either immediately or within a very short time after it has been applied.

The Director further states that it is not so much the manurial value of lime that is of importance to our growers, excepting, of course, in the case of soils which are actually deficient in this material, as the effect that lime has in rendering plant foods present in the soil in an unavailable condition available for plants' use. This is of very great importance at the present time, when, owing to the war, there is a great scarcity of potash, as lime added to the soil has a tendency to render available a certain proportion of the potash contained in the soil, which is at present in an unavailable condition.

With respect to the different forms of lime and to their relative values, the Director points out that 100 lb. weight of pure limestone (carbonate of lime) when burnt will yield 56 lb. of caustic lime, that is, burnt or stone lime, 44 lb. being lost during the burning in the form of carbonic acid gas. Therefore, it can generally be assumed that 1 ton of newly-burnt limestone contains approximately twice as much actual lime as 1 ton of ground limestone, or of 1 ton of completely air-slacked burnt lime.

The value, therefore, of burnt limestone is about double that of ground limestone or air-slacked lime.

Pastoral.

PROPOSED TYPE STANDARD FOR BRITISH BREEDS OF SHEEP.

The Committee of the Flock Book for British Breeds of Sheep in Australia has drawn up type standards for the British breeds of sheep. Amongst them are two breeds which are of especial interest to farmers who are entering largely into sheep-raising on the coast lands of Queensland. These are the Border Leicester and the Romney Marsh sheep.

DESCRIPTION OF A BORDER LEICESTER SHEEP.

Head.—Medium-sized, smooth crowned, wide in forehead. Full and even down the face to a slightly Roman nose. perfectly free from wool, and covered with pure white soft hair; occasionally a black spot will appear.

Face.—Strong jaw and clean cut; nostrils wide and dark.

Eyes.—Full and prominent, but mild and placid, with a quiet. gentle expression.

Ears.—Lively mobile. Medium-size and semi-erect. White inside and out. Blacks spots sometimes appear with age.

DESCRIPTION OF A ROMNEY MARSH SHEEP.

Head.—Wide; good thick foretop; broad forehead with no horns.

Face.—Level between the ears and white in colour. Nose coal black. Face of ewes full; of rams broad and masculine.

Eyes.—Large, bright, and lustrous.

Ears.—Of good size.

Neck.—Well set in at the shoulders, strong and thick.

Shoulders.—Wide, well put in and level with the back.

Chest.—Wide and deep.

Back.—Straight and broad.

Ribs.—Well sprung; wide across hips.

Hind Quarters.—Rump well turned; thighs well let down and developed. Legs should be short, with big bone and large shapely feet of black horn. Skin should be of a clean pink colour.

A WORM NEW TO QUEENSLAND.

By W. G. BROWN, Instructor in Sheep and Wool.

In last month's number of the "Queensland Agricultural Journal," I mentioned that a parasite of sheep, which has, hitherto, been unknown in Queensland, was found by me in a flock of sheep.

This month the accompanying plates show the kind of worm to be looked for—*Trichocephalus affinis* or Cæcum Worm. Plate 6—shows details, and is taken from Cooper Curtice's "Animal Parasites of Sheep," p. 100.

The explanation is as follows:—

TRICHOCEPHALUS AFFINIS, Rudolphi.

PLATE 6.

Fig. 1. Piece of *cæcum* with *trichocephali* attached, natural size; *a, a, females*; *b, b, males*.

Fig. 2. Male, × 7; *a, capillary cephalic end*; *b, coiled caudal end*; *c, protruded intromittent organ*; *d,* the *convoluted,* and *e,* the *straight* portion of the *seminal apparatus*; *f, seminal reservoir*; *g, intestine.*

Fig. 3. Female, × 7; *a, capillary cephalic end*; *b, vulva*; *c, vagina*; *d, uterus*; *e, oviduct*; *f, convoluted ovary*; *g, intestine*

Fig. 4. Caudal end of male enlarged; *a, end of the body*; *b, spine-covered tube of intromittent organ*; *c,* its *inflated end*; *d, spiculum.*

Fig. 5. Cross-section of end showing how the outside sheath becomes converted into the inside sheath of the tube; *a, a,* the *sheath*; *b,* the *sac* formed; *c,* the hollow *spiculum.*

Fig. 6. End of sheath, much enlarged, to show the relation between *sheath* and *spiculum.*

Fig. 7. The head.

Fig. 8. The *vulva* and *vagina,* with an egg in the passage.

Fig. 9. Eggs; *a,* eggs *without shells*; *b,* egg *with shell* and its *characteristic polar bodies*; *c, intermediate* between *a* and *b.*

Fig. 10. Enlarged portion of worm from near the head.

Plate 6 is a piece of cæcum taken from a sheep killed for post-mortem examination, and shows the enormous number of worms which were present in the animal.

Twenty-five per centum of the sheep died before the treatment (drenching with arsenic) took effect. I am pleased to state that since the fourth and last drenching the rest of the flock have quite recovered, and are quite free from this parasite, which proved so stubborn to remedial measures. I am hoping that pastoralists and sheep farmers generally will keep a sharp lookout for this pest. We may thus be able to suppress it before it is added to the long list of introduced pests in this country.

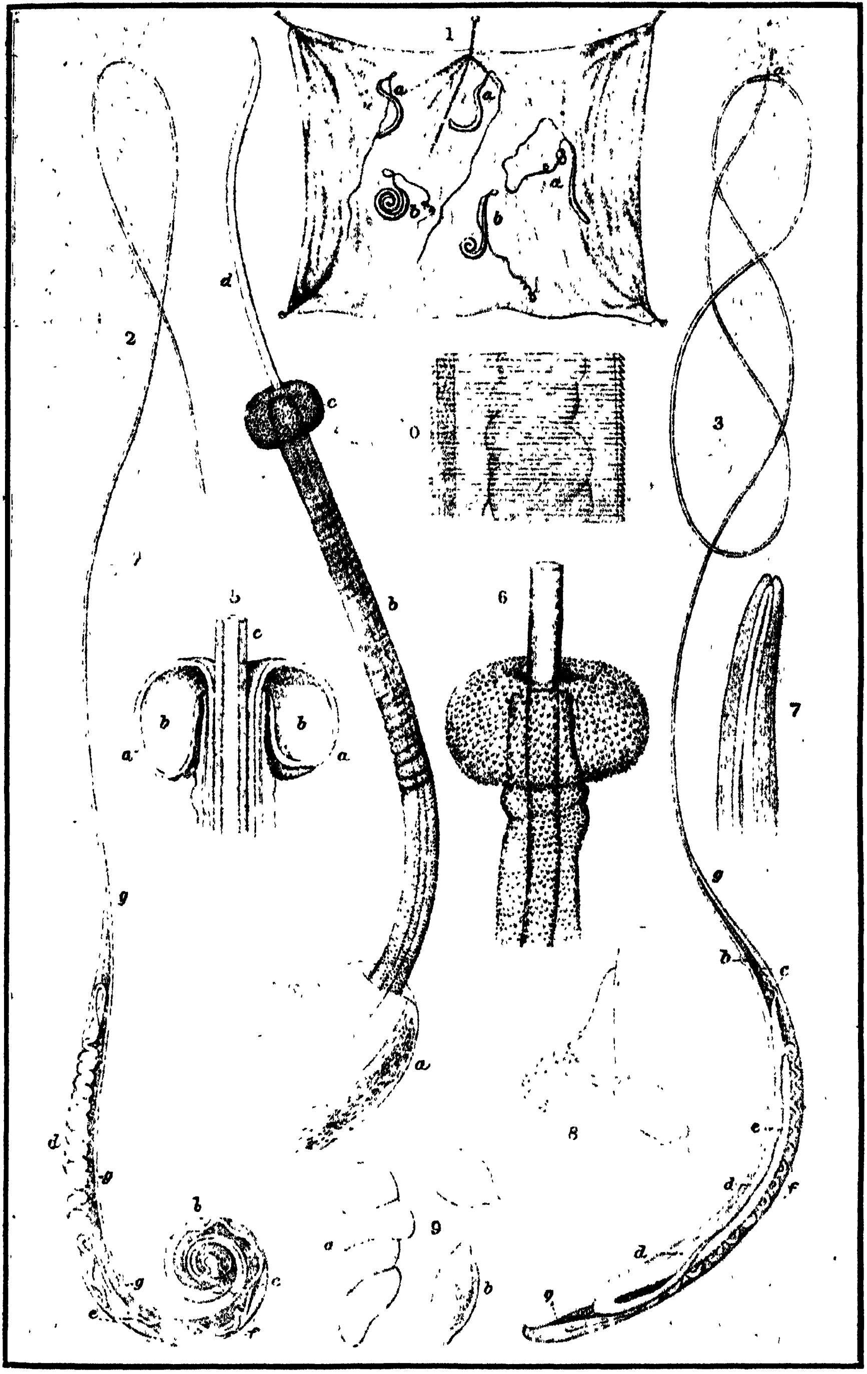


Plate 6.—Trichocephalus affinis.
No. 1.—After Cooper Curtice.

PLATE 7.—TRICHOCEPHALUS AFFINIS.

No. 2.—From a Sheep in Queensland.

IMPORTATION OF NUBIAN GOATS.

Our attention has been drawn to a paragraph in our article on the Nubian goat, in the June issue of this Journal for 1916, dealing with the regulations for the export of domesticated animals from Egypt and import into Queensland. The paragraph in question was derived from information sent from the Ministry of Agriculture, Cairo, dated 28th February, 1916, and reads as follows:—

"Prohibition as to export from Egypt and import into Queensland: Provided that the permission of the Minister shall be obtained prior to the departure of any domesticated animal from the port of shipment to Australia, such animals may be imported into Australia, presumably if covered by a certificate by a member of the Royal College of Veterinary Surgeons."

The Director of Quarantine, Quarantine Bureau, Melbourne, Commonwealth of Australia, points out that the wording of the Commonwealth Proclamation is:—

"The Minister may permit the importation into Australia of domesticated animals by the Chief Quarantine Officer of the State into which it is desired to import them, subject to permission being given by him to the departure of the animals from the port of shipment and to any further conditions which he may see fit to impose."

While the conditional importation by the Chief Quarantine Officer is permitted with the object of enabling the State authorities to import for experimental purposes, it is not advisable to allow importation, and such importation cannot be permitted. The matter is under Commonwealth control, and any importation must be effected by the Chief Quarantine Officer in accordance with the terms of the Proclamation, and the importation is governed by any conditions which the Minister may think fit to make.

We ask our readers to make a note of the above regulation in the event of any person being desirous of importing Nubian goats.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF JUNE, 1916.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Thornton Fairetta	Jersey	26 May, 1916	676	5·1	40·71	
Cocoatina ...	,, ...	17 Mar. ,,	558	5·5	36·35	
Lady Melba	Holstein	28 Oct., 1915	670	4·0	31·46	
Iron Plate ...	Jersey	20 Jan., 1916	560	6·1	31·32	
Auntie's Lass	Ayrshire ..	4 April ,,	604	4·0	28·36	
Lady Margaret	,, ...	14 Oct., 1915	474	5·0	27·96	
Lady's Maid	Shorthorn . ..	26 Jan., 1916	548	4·2	27·05	
Belinda ...	Ayrshire . ..	27 Feb. ,,	569	4·0	26·72	
Lady Loch II.	,, ...	17 Mar. ,,	564	4·0	26·48	
Twylish's Maid	Jersey .	22 Oct., 1915	368	6·0	26·14	
Constancy ..	Ayrshire	24 Nov. ,,	399	5·3	24·98	
Charity ..	Jersey	28 May, 1916	419	4·9	24·21	
Sweet Meadows	,, ..	28 Sept., 1915	289	7·0	24·00	
Lady Spec...	Ayrshire ..	6 Jan., 1916	513	3·8	22·96	
Queen Kate	,, ...	15 June ,,	495	3·8	22·06	
Violette's Peer's Girl	Jersey	8 Dec., 1915	312	5·8	21·42	
Jeannie ...	Ayrshire	1 Nov. ,,	406	4·4	21·03	
Mistress Bee	Jersey	21 Jan., 1915	327	5·2	20·08	
Netherton Belle	Ayrshire	23 April ,,	354	4·8	20·02	

For the first three weeks of the month the cows were fed on natural pasture only, but during the remainder of the time they received, in addition, a ration of Soudan grass and lucerne chaff. They showed a very marked increase in yield on being thus fed, and greatly relished the chaffed Soudan grass.

DENSITY OF AUSTRALIAN HONEY.

The Government Agriculturist in Victoria, in an article in the "Leader," referring to density of the honey of Australia, America, and Europe, says that, owing to the dry climate, Australian honey is generally more dense than that of other countries. In Europe and America the denser honey is found in capped combs, from which the atmospheric moisture is excluded, but here the experience is the reverse; the capping, instead of preventing the honey from absorbing moisture, preserves the natural moisture of the honey from desiccation, while uncapped honey is often so thick as to be extracted with difficulty. The water content of Australian honey runs from 17 down to 12 per cent., while in Europe and America it is generally from 25 to 27 per cent. One effect of this is that local honey, when in a damp atmosphere, absorbs moisture, the exposed surface becoming wet and soft. This does not affect the bulk of the contents of the jar or tin, however, as water, being lighter than honey, does not penetrate the mass. On the other hand, when honey is exposed to a dry atmosphere, the water it contains is drawn off by evaporation, even from the centre of the mass, owing to the specific gravity of the honey being greater than that of water. As an article of food the value of the honey is increased by its density.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JUNE, 1916.

Five thousand nine hundred and seventy-one eggs were laid during the month. Most of the birds that were in moult are now looking well and should soon be laying again if the weather does not keep them back. During the last twelve days we have had nine of westerly winds, with two wet days in between. This has had the effect of checking the laying somewhat. Mrs. Jobling wins the monthly prize with 125 eggs. The following are the individual records:—

Competitors.	Breed.	June.	Total.
*T. Fanning	White Leghorns	101	329
*J. Zahl	Do.	104	297
*Mrs. J. Jobling, N.S.W.	Black Orpingtons	125	295
A. Howe, N.S.W.	White Leghorns	123	277
*A. T. Coomber	Do.	90	276
*Dixie Egg Plant	Do.	100	270
*Miss M. Hinze	Do.	122	263
G. H. Turner	Do.	113	254
W. Meneely	Do.	122	252
*J. M. Manson	Do.	120	244
T. B. Hawkins	Do.	82	240
Dr. E. C. Jennings	Do.	117	240
Mrs. Munro	Do.	101	231
S. B. Tutin	Do.	88	228
W. Lyell	Do.	92	227
Geo. Tomlinson	Do.	113	225
*E. F. Dennis	Do.	92	220
*A. E. Walters	Do.	93	216
*E. A. Smith	Do.	93	214
A. W. Bailey	Do.	110	214
*J. Anderson, Victoria	Red Sussex	53	210
*J. F. Dalrymple, N.S.W.	Rhode Island Reds	102	209
Geo. Prince	White Leghorns	123	208
J. M. Manson	Black Orpingtons	103	208
*Kelvin Poultry Farm	White Leghorns	65	207
P. Brodie	Do.	86	205
H. Jobling, N.S.W.	Black Orpingtons	101	204
T. E. Jarman, N.S.W.	White Leghorns	83	203
H. W. Board	Do.	103	202
J. R. Wilson	Do.	122	198
C. P. Buchanan	Do.	89	198
T. Taylor	Do.	98	194
Mrs. W. D. Bradburne, N.S.W.	Do.	67	192
Kelvin Poultry Farm	Do.	87	190
*E. West	Do.	100	184
*W. L. Forrest, N.S.W.	Do.	107	183
A. H. Padman, S.A.	Do.	66	183
*C. Knoblauch	Do.	89	182
Mrs. C. Davis	Do.	98	178
A. F. Camkin, N.S.W.	Do.	101	178
F. Clayton, N.S.W.	Do.	88	173
*J. H. Gill, Victoria	Do.	77	173

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	June.	Total.
Mars Poultry Farm	White Leghorns ...	92	167
J. Gosley	Do.	71	157
King and Watson, N.S.W.	Do.	71	148
*J. H. Madrers, N.S.W.	Rhode Island Reds ...	53	147
R. Burns	S. L. Wyandottes ...	104	146
Cowan Bros., N.S.W.	Black Orpingtons ...	104	142
*W. H. Knowles, junr.	White Leghorns ...	69	140
E. Pocock	Do.	75	137
T. Fanning	Black Orpingtons ...	74	136
W. Hirst, N.S.W.	White Leghorns ...	74	133
E. W. Holland	Do.	46	127
W. H. Forsyth, N.S.W.	Black Orpingtons .	78	127
J. Anderson, Victoria	White Leghorns ...	66	123
F. Clayton, N.S.W.	Rhode Island Reds ...	66	115
W. Purvis, S.A.	White Leghorns ...	57	111
R. Burns	Black Orpingtons ...	70	109
Cowan Bros., N.S.W.	White Leghorns ...	85	108
*J. W. Macrae	Black Orpingtons ...	74	107
W. Becker...	White Leghorns ...	55	106
J. G. Richter	Do.	78	106
E. F. Dennis	Black Orpingtons ...	97	100
A. T. Coomber	Sicilian Buttercups ...	31	98
L. K. Pettit, N.S.W.	White Leghorns .	65	90
Mars Poultry Farm	Black Orpingtons ...	65	68
F. W. Leney	White Leghorns ...	32	57
W. Lindus, N.S.W.	Do.	17	51
Harveston Poultry Farm	Do.	30	48
H. Hammill, N.S.W.	Do.	20	45
F. W. Leney	Rhode Island Reds	0	39
E. F. Dennis	White Wyandottes ...	35	35
Moritz Bros., S.A.	White Leghorns ...	8	13
Totals	...	5.971	12,510

* Indicates that the pen is competing in single pen test.

RETURNS FROM SINGLE PEN TESTS FOR THREE MONTHS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
T. Fanning	60	64	60	58	50	37	329
J. Zahl	49	48	55	43	53	49	297
Mrs. Jobling	63	73	28	53	32	46	295
A. T. Coomber	53	55	49	36	36	47	276
Dixie Egg Plant	68	60	52	45	0	45	270
Miss M. Hinze	47	33	64	38	42	39	263
J. Manson	22	65	39	32	54	32	244
E. F. Dennis	39	53	20	48	34	26	220
A. E. Walters	36	64	26	20	48	22	216
E. A. Smith	55	26	28	59	28	18	214
J. Anderson	51	21	49	0	59	30	210
J. F. Dalrymyle	41	22	52	11	39	44	209
Kelvin Poultry Farm	31	20	46	28	46	36	207
E. West	50	39	14	19	8	54	184
W. L. Forrest	30	38	29	45	29	12	183
C. Knoblauch	42	24	16	29	34	37	182
J. H. Gill	3	59	5	58	21	27	173
J. H. Madrers	12	31	34	47	22	1	147
W. H. Knowles, junr.	39	12	28	6	27	28	140
J. W. Macrae	0.	40	34	3	18	12	107

DOUBTFUL EGGS—WHO IS TO BLAME?

(By D. F. LAURIE, Poultry Expert and Lecturer.)

Recent market reports published in Sydney state that the market was depressed owing to large shipments of eggs to arrive from Adelaide. It was stated that the quality was doubtful. In Adelaide papers we read, in the market reports, that owing to the hot weather the quality of the eggs coming into the sale rooms was such that buyers were very chary of operating. Much has been written about the egg and its varying quality; and at times an element of humour has been added—not perhaps shared by those who have had an unpleasant surprise in ascertaining the quality of an egg which manifestly was not doubtful. It would seem, however, that in the 20th century, when we hear so much about the need for marketing all farm produce to the best advantage, it is a great reflection upon those who are responsible for the marketing of unsound eggs. Fatalism seems a characteristic of many people in this respect—they accept good eggs and bad with seldom a protest. Surely in these enlightened days no one cares to be thought so ignorant that good money is passively paid for produce that is not only unfit for consumption but the sale of which is in the nature of fraud.

There are various enactments which govern the sale of milk, vinegar, and so on, but there seems to be no means of bringing to book those who are responsible for the sale of unsound eggs. It is bad enough within the confines of our own State. Here the only result is that consumers are discouraged from buying as many eggs as they would if reliable eggs only were permitted to be sold. The fact that people who pay, say, a shilling for a dozen eggs, of which lot three or four are unfit to use, are in reality paying 1s. 3d. to 1s. 4d. a dozen, is a matter of domestic economy. Where the real damage to trade occurs is in regard to our surplus eggs. South Australia exports a large surplus of eggs. The price depends first on the old law of supply and demand, and secondly upon the quality of the eggs themselves. If none but fresh infertile eggs were concerned, then our merchants—with careful packing—could ship to the other States with the certainty that there would be no claims for unsound eggs. Now, some people are of the idea that the shippers are prepared at all times to bear uncomplainingly the loss on such shipments. That is not so. Due allowance is always made. During the colder portions of the year, when eggs are not affected by heat, the margin allowed is much less than in the hot months, when a large proportion of the eggs are approaching the limits of stability. At such times the risks are so considerable that buyers will not operate except at very low prices.

Now, there can be no doubt that among the producers there is a proportion who, whether from ignorance or carelessness, market eggs of most inferior quality. These people, no doubt, receive market rates, less carriage, commission, &c., and trouble no more. They do not perceive, and probably do not care for, the fact that if the eggs were of high quality, the average price paid by the collectors and others would be pence per dozen higher. The man who suffers most, and is practically impotent in the matter, is the careful poultry farmer who markets only fresh infertile eggs. If these are sent to the salesmen he at best receives for them the highest ruling rate. But the important point is that this rate is a depressed rate, due to the unsound eggs which come from the country. The sellers of unsound eggs are a drag on the industry.

We boast that our country is a free country; but surely one could not justify the statement that producers are free to sell articles of food —eggs—which are quite unfit for human consumption. While such people exist the poultry industry is hampered. Without doubt the industry would be in a better position if all those whose habit it is to market these unsound eggs were to cease keeping poultry of any sort. You cannot build up a good trade on a rotten foundation.

In apportioning the blame, it may be pointed out that the following are contributory factors:—

1. The presence of surplus male birds on farms, and the practice of allowing the males to run promiscuously with the farm flock. In this connection I know there is much ignorant prejudice. At any rate, the fact remains that while an infertile egg will keep for a lengthy period, and is the only egg which should be sold for human use, the fertilised egg is quite unfit for trade purposes.

2. Eggs are collected spasmodically, instead of regularly once a day at least. The eggs are permitted to remain in hot nests.

3. Broody hens occupy the nests in which other hens lay. They sit on the eggs until such time as they are gathered, by which time incubation is more or less advanced.

4. The eggs are packed in mouldy straw, which is often damp. Damp packing material generates fungoid growths, which invade the egg and cause decay.

5. The method of collecting and forwarding eggs to market is archaic and needs modernising.

Much improvement would be possible if storekeepers and others set their faces against dealing in doubtful eggs. It is a well-known fact that in country districts storekeepers are practically forced to buy stale eggs or lose custom. People have told me that they could only market the eggs collected on the farm once a fortnight. Such people should go out of the business. Far more improvement would result if it were made illegal to sell stale eggs, and if that much-wished-for enactment were vigorously enforced.

Let everyone who has eggs to sell carefuly examine himself or herself on these points. Then, if the sinners are content to continue such practices, by all means let them wallow in their filth.

Local authorities are prone to display much activity in directions which to many people appear of secondary consideration. Does it not occur to them that the consumption of unsound eggs is a menace to human health? Naturally, even the most easy-going person does not consume a bad egg when it is boiled. Evidence has been given, however, that unsound eggs are used in a cooked form. Flavouring matter is added to disguise the awful taste of bad eggs—but the discerning palate oft notices that the egg triumphs. A proper system of inspection would remedy this evil.

One result of the war is the imperative demand for greatly increased production of food for the nation. The egg is a most important article of food. Not only is it food for the ordinary man, but it is invaluable, and there is no substitute for the fresh egg for use in hospitals for our sick and wounded heroes. One feels inclined to class with the Huns those who market rotten eggs when, with a little ordinary care and cleanliness, such eggs could be sold fresh and sweet, and so increase the value of our productions.—"Journal of Agriculture, S.A.," vol. xix., No. 7.

THE TREATMENT AND PREVENTION OF SORE-HEAD, OR CHICKEN POX, BY MEANS OF VACCINATION.

(" Hawaiian Forester," May, 1916.)

INTRODUCTION.

Every poultry raiser in this territory is familiar with the sores and tumors on the comb and wattles, and diphtheritic exudations in the eyes, nostrils, and mouths of chickens, which characterise this disease. It is, therefore, not necessary here to discuss its nature or cause beyond stating that it is a highly contagious disease affecting chickens, turkeys, and pigeons, and, to a much less extent, water fowl and guinea hens. When once the disease gains entrance to a flock it spreads quickly, and since the infection is very resistant to disinfectants, it is difficult to eradicate it. The need for the immediate isolation of all diseased fowls from the flock, the removal and burning of all dead fowls, and the cleaning and disinfecting of the houses and yards, is apparent.

TREATMENT.

The usual manner of treating sore-head is by removing the scabs or crusts as soon as they form, and then apply to the raw surface various chemical disinfectants, such as silver nitrate, copper sulphate, permanganate of potash, or tincture of iodine. When the disease is of a mild form, and the birds fully grown and strong, this treatment at times serves to check it, but in most cases it is of doubtful value. It is, therefore, of great interest to all poultry raisers and fanciers that a new method of treatment has been found which seems to be very promising, both as a preventive and a cure. This treatment was first suggested in 1910 by a German scientist (Manteufel), but it was not until American investigators (Hadley and Beach, 1913; W. B. Mack, 1915, and J. R. Beach, 1915) had devoted much time and study to its development and standardisation that the present method of preventive vaccination has been evolved.

PREVENTIVE VACCINATION.

The principle of this treatment consists in the preparation of a vaccine from the crusts and scabs which form on the comb and wattles of the affected birds, and the injection of this vaccine beneath the skin of both affected and exposed birds. The method of preparation is very simple, and can be undertaken by anyone who is in possession of a good dairy thermometer and understands the first principles of absolute cleanliness. But as many poultry raisers will feel timid about injecting into valuable birds a solution which they know contains the disease germ, it may be safer for them first to learn to administer the vaccine and satisfy themselves of its beneficial effect, before they attempt to prepare it. For those who feel this way about it, the following is suggested:—

COLLECTING AND FORWARDING SCABS FOR VACCINE.

Until such a time as poultry raisers in the Territory feel confident of the value of the vaccination treatment, the Territorial Veterinarian will prepare and, whenever possible, return by first mail the vaccine made from scabs forwarded to his office for this purpose.

When care is taken promptly to isolate all affected birds, the disease as a rule spreads slowly, and as it is necessary that a sufficient quantity of crusts or scabs should form in order to obtain material for the treatment of the entire flock, there is little danger of heavy losses, even if four to six days will be required for the forwarding, preparation, and return of the scabs and vaccine.

The best scabs, and in fact the only ones to use for vaccine, are those which form on the comb, wattles, and the skin of the head. In no case use the exudate which forms in the eyes, nostrils, or mouth. Place the scabs in a small bottle, previously cleaned with boiling water and drained until dry. At least one heaping teaspoonful of scabs will be required for the vaccination of a flock containing from 75 to 100 birds, but as this quantity provides for two injections (the second injection following the first after five to seven days), it is not necessary that the entire amount should be forwarded at once. For a flock of 25 to 30 chickens, a much smaller quantity will suffice for the first injection, and as the treatment does not immediately stop the further development of sores or tumors, a sufficient quantity of scabs for the second treatment will usually develop during the interval between the two injections. The second crop should, therefore, be forwarded not more than five to seven days after the first was sent.

Wrap the bottle well and place it in a small box or mailing case plainly addressed to the Division of Animal Industry, Board of Agriculture and Forestry, Honolulu, and send it by special delivery. Full information concerning the number, class, breed, and age of the birds to be treated must accompany the shipment, as well as plain instructions as to where the vaccine should be returned.

METHOD OF PREPARING THE VACCINE.

The method of preparing the vaccine, vaccination, precautions to be observed, and treatment, evolved by Dr. J. H. Beach, of the University of California, and the ones which have been followed here, are substantially as follows:—

One-half gram of chicken-pox scabs to 100 cubic centimeters* of physiological salt solution is the proportion used. The scabs are first weighed out and ground in a sterile mortar with a small amount of the sterile salt solution until they are pulverised. This amount is then filtered through absorbent cotton into a sterile flask or bottle, and the remainder of the salt solution poured through the filter so as to wash out as much of the pulverised material as possible. The flask is then stoppered, placed in a water bath, and heated at a constant temperature of 55 degrees Centigrade for an hour. The vaccine is now ready for use. It is very essential that the vaccine be used as soon after preparation as possible. Since no preservative is used, it will deteriorate if allowed to stand.

METHOD OF VACCINATION.

The vaccine is administered by injecting it beneath the skin with a hypodermic syringe. Two doses of one cubic centimeter each are given five to seven days apart. The most convenient place for administration is beneath the skin of the side under the right thigh, the skin at that point being comparatively free from feathers. The left wing is held back, the fowl laid on its left side, and the right wing and leg and feathers held back with the last three fingers of the left hand. The exposed skin is then cleansed with a piece of cotton saturated with disinfectant solution (2 per cent. solution of compound solution of cresol) and picked up with the thumb and forefinger of the left hand. Then with the right hand the syringe needle is inserted beneath the skin and the proper dose injected. A syringe of one cubic centimeter capacity is well suited for this work, when small flocks are to be treated. (Ask your druggist for Cutter's Tuberculin Syringe.)

PRECAUTIONS TO BE OBSERVED.

1. The vaccine being in an unpreserved condition will soon decompose and become unfit for use. Therefore, if possible, it should be used within three days. If old, decomposed vaccine is used, bad results will follow.

2. Vaccine should be kept in a cool place, on ice if practicable, until used, and only one bottle opened at a time.

3. A small, wide-mouthed, covered vessel, such as a quarter-pint milk bottle or a jelly-glass, should be provided as a vaccine container from which to fill the syringe. This should be sterilised by boiling before it is used, and should be kept covered at all times except when the syringe is being filled.

4. The syringe should be sterilised by boiling, or by soaking for several minutes in a 10 per cent. solution of compound solution of cresol, followed by rinsing with boiled water.

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* The cubic centimeter is about 0·061 cubic inches.

5. All diseased fowls should be removed from the flock and treated.

6. The immunising effect of the vaccine does not take place immediately; therefore, the fowls already infected at the time of vaccination or soon after will, in most cases, develop chicken-pox lesions. Such cases are usually very mild and will soon recover if the fowls are removed from the flock and the lesions treated.

7. The hypodermic needle should be inserted *just under the skin* and not in the muscle.

TREATMENT.

Of the various kinds of disinfectants recommended for the treatment of this disease *tincture of iodine* has been found to be the most satisfactory. The scabs which form on the sores of the comb, wattles or skin should be removed with a dull knife or with the nails, and tincture of iodine applied to the exposed surface.

Collections of exudate on the mucous membrane of the mouth should be removed with forceps or a scoop and the exposed membrane treated with tincture of iodine. All collections of exudate within the eyelids can usually be removed by pressing with the thumb and finger tips around the eye. If any of the exudate should adhere to the eye it should be removed with forceps, and it may sometimes be necessary to use forceps also in removing the exudate from beneath the third eyelid at the inner corner of the eye. Afterwards drop a small amount of tincture of iodine into the eye.

The tincture of iodine can be applied most conveniently in all cases with a medicine dropper. Treatment should be repeated as often as the scabs or exudate reform. Any fowl that does not show a marked improvement in condition after three or four treatments will usually recover very slowly. In such cases, unless the fowl be very valuable for show, breeding, or other purposes, it is more economical to destroy it than to give further treatment.

Collections of exudate within the nasal cavities always produce marked swellings of the face. This condition is relieved by making an incision through the skin over the swelling, removing all the exudate with a pair of forceps or scoop, and then packing the cavity with absorbent cotton saturated with tincture of iodine. The cotton pack is necessary to keep the incision through the skin from healing too rapidly. If not packed, the wound will quickly heal, the exudate reform, and no benefit be derived from the operation. The pack also assists in controlling the hemorrhage, which is always severe. When the hemorrhage is unusually severe, it should be checked by the application of a strong caustic, such as silver nitrate. The cotton pack should be removed, the wound cleansed and a new pack put in every two or three days as long as the exudate continues to form. When, upon removal of the pack, it is found that no exudate has formed, the pack may be left out and the wound allowed to heal. The administration of vaccine in addition to local treatment will shorten the course of the disease and decrease the mortality from all types of the disease.

The Orchard.

FIJI BANANA TRADE.

The "Fiji Planters' Journal" for May, 1916, published the following statistics realtive to the Fijian exports of bananas during the first quarters of 1914, 1915, and 1916:—

Month.	To Australia.	To New Zealand.	Total.
	Bunches.	Bunches.	Bunches.
	1916.		
January	92,980	52,837	145,817
February	86,277	33,365	119,642
March	141,789	38,110	179,899
	321,016	124,312	445,358
	1915.		
January	51,913	22,111	77,024
February	41,982	19,984	61,966
March	58,111	16,825	74,936
	165,606	58,920	213,926
	1914.		
January	106,324	31,864	138,188
February	116,958	26,674	143,632
March	106,514	37,033	143,547
	329,796	95,571	425,367

The record quarter-year's export was 425,367 in 1914.

The record quarter-year's export was 445,358 in 1916.

The bananas were packed in cases, each containing two bunches.

"Fruit World" (1st July) publishes the following information on the Fiji banana trade:—

Mr. J. W. Philpott, Inspector of Produce, furnishes particulars of the export of bananas from Fiji to Australia and New Zealand for the first five months of this year.

The figures are as follows:—

	Australia. Bunches.	New Zealand. Bunches.	Total.
January	92,980	52,837	145,817
February	86,277	33,365	119,642
March	141,789	38,110	179,899
April	86,828	42,757	129,585
May	93,261	41,180	134,441
Totals	501,135	208,249	709,384

The total shipments are equal to 709,384 bunches.

For the corresponding period of last year the total was 303,268 bunches, so the export is more than double that of last year.

EXPERIMENT IN SHIPPING DURIAN SEEDS.

From the "Bulletin of the Department of Agriculture" of Trinidad and Tobago, the "Agricultural News" of Barbados takes the following useful note on the shipping of Durian seeds:—

It is often thought that seeds which are to be sent long distances should be thoroughly dried, and packed as dry as possible to insure a good germination. The following experiment made with seeds of the famous Malayan fruit the durian (*Durio zibethinus*), shows that this is not always the case.

On 4th May, 1915, Dr. P. J. S. Cramer, Chief of the Plant Breeding Station, Buitenzorg, Java, sent by parcels post three boxes, each of which contained four durian seeds. These seeds are moderately large, about ¾ in. to 1 in. long and ½ in. or more in diameter. The boxes were all the same size—namely, 4 by 3 by 2 in. The seeds were loosely packed with charcoal mixed with coconut fibre refuse. Box No. 1 was packed dry; 25 c.c. of water was added to box No. 2, and 50 c.c. of water to box No. 3. The seeds reached Trinidad on 6th July, having been two months on the way.

When the boxes were opened it was found that all the seeds in box No. 1 had dried up completely and were mere shells which could be crushed between the fingers. In box No. 2 there were two good seeds which had already begun to germinate, while the other two were rotted. In box No. 3 all the seeds were good and had germinated *en route*, but one had grown so much that the shoot was badly broken. The seeds were handled carefully and planted in pots in a mixture of coconut fibre refuse and sand. One plant got broken off accidentally, but the other four have grown well, three now being 14 in. high and one 20 in. high.

As the durian seed has the reputation of being a difficult shipper, four plants from twelve seeds after a journey of two months would seem to be very good. With many similar seeds it is probably principally a question of giving the right degree of moisture to the packing material.

[In 1882 we obtained some seeds of Durian and Mangosteen at Batavia, which were dried. On arrival at Brisbane, we found them all dried up and useless.—ED. "Q.A.J."]

FARMING AT LANDSBOROUGH.

The accompanying two photographs represent portion of the Messrs. Skerman's banana plantation, Bald Knob, Landsborough, and part of an experimental plot of 3 acres belonging to Mr. J. Brennan, which are situated on the north side of Landsborough towards Tunnel Ridge. We hear very little about this part of the country, either from fruitgrowers or agriculturists, yet the photographs serve to indicate that there are people in the district who are testing its capabilities. These pictures were sent to us by Mr. Richard E. Swan, of Landsborough, who further states that the Messrs. Skerman's banana plantation covers 20 acres, and has been continuously under this crop for nine and a-half years, which affords a good illustration of the great fertility of the soil, which is further indicated by the fine growth of plant sugar-cane on Mr. Brennan's land.

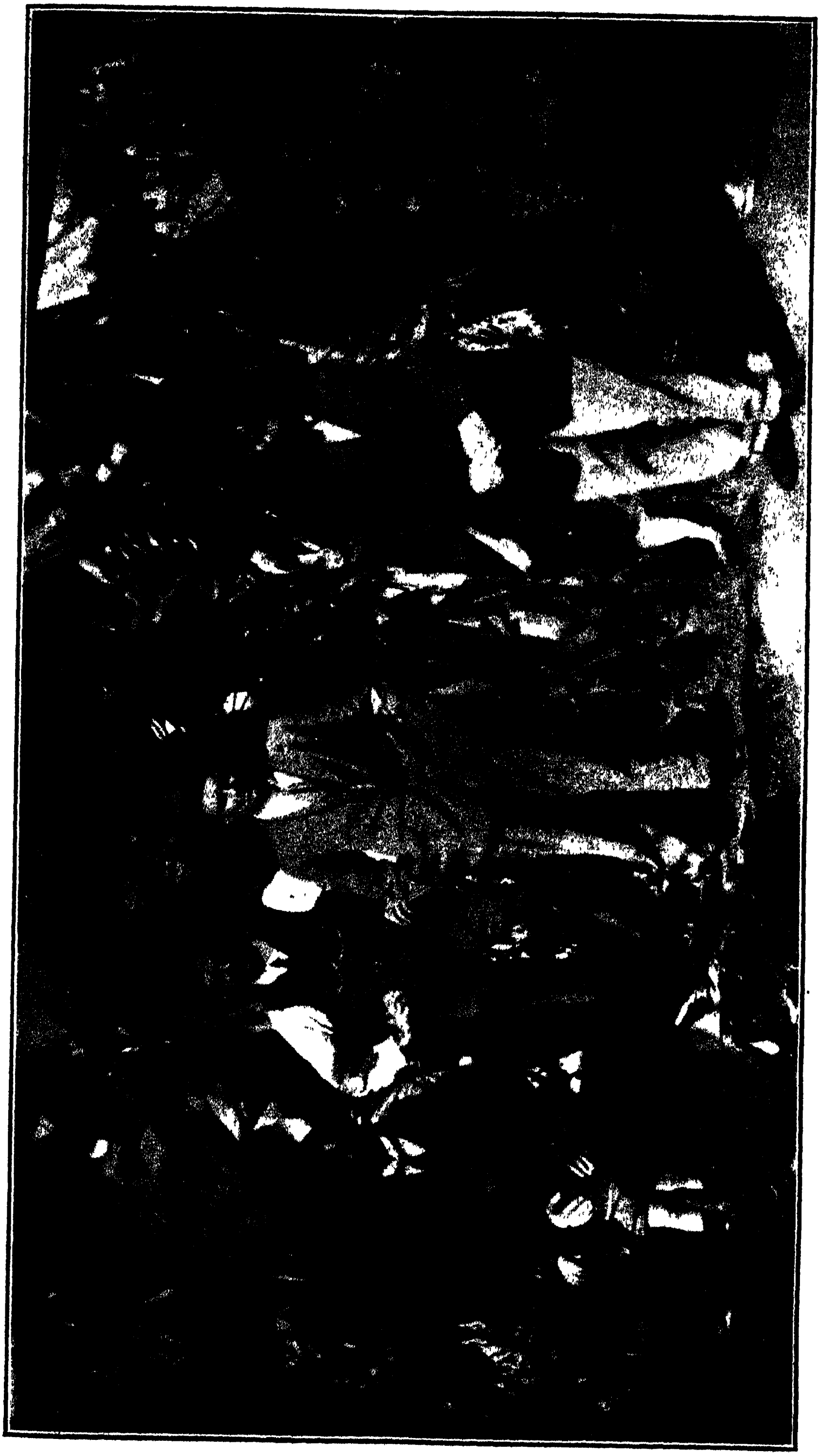

Plate 8.—Portion of Messrs. Skerman's 20-acre Banana Plantation, Landsborough.

PLATE 9.—PLANT CANE ON J. BRENNAN'S FARM, NEAR LANDSBOROUGH.

SOME NOTES ON CITRUS CANKER.

BY J. R. CULLEN,

President of the Montville Fruitgrowers and Farmers' Progress Association.*

Although this disease has, as far as is known, not yet been introduced into Australia, still it is quite time that the citrus-growers and nurserymen here should have some knowledge of this dread disease, so that, in the unfortunate event of it being introduced into the Commonwealth, it will be at once recognised as such, and steps taken to have it stamped out before the infection has had the time or opportunity to spread; for there is not the slightest doubt that when those interested know what citrus canker really is they will leave no stone unturned to prevent it getting a hold amongst the orchards and nurseries of the Commonwealth. We have had quite enough experience already of imported pests. "Forewarned is forearmed."

This paper makes no pretensions to be a scientific monograph on the subject of citrus canker, but it aims at providing all those who are in any way interested in citrus culture with the requisite knowledge to enable them not only to recognise the disease should it appear in Australia, but also to insist on such precautions being taken as will practically prevent its introduction amongst us.

The disease known as citrus canker (occasionally called Japanese canker) seems originally to have come from Japan or Eastern Asia, and was introduced from there to the Philippine Islands and then from either or both of these sources into the Gulf States of the United States of America, originally in Texas. It has spread and ravaged the citrus orchards in Florida, Alabama, Missisippi, and Louisiana, and it is in these States that the disease has been thoroughly investigated and studied by the inspectors and officers of the States Experimental Stations; and, finally, so serious has it become that it has been taken over by the U.S.A. Federal Department of Agriculture, who are at present moving heaven and earth in the hope of eradicating it, and enormous sums of money have already been spent, subscribed to by the departments, by various organisations, and also by private subscription.

The disease was, it is thought, originally introduced on the stocks of Satsuma and Trifoliate orange imported for planting, and was not for some years recognised as a new disease. At first, too, it was thought that the only variety affected was the Grape Fruit or Pomelo, but since then its ravages have been found to affect almost equally all varieties of orange and mandarins, seedling or worked, and even the Australian native orange, the kumquat, sometimes used there as a stock for budding, has been affected with the pest. Both limes and lemons, too, are attacked, with the same fatal results, and it appears that the disease is as impartial as to what variety it affects as it is virulent in its action. When it is remembered that it was as short a while ago as September, 1912, that it was first noticed, and even July, 1913, before it was definitely announced as a new and dangerous disease, it will be seen to what extent it has spread.

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* In "The Journal of Scientific Research," Department of Agriculture, Washington, Vol. VI., No. 2, April, 1916, will be found a full monograph on "Citrus Canker," by F. A. Wolff, Plant Pathologist, Alabama Agriculture Experiment Station, and to whom I am greatly indebted for much of the information in these notes.

Citrus canker is general in its action, and affects equally leaves, twigs, branches, and fruit, and upon any of these the disease, when fully developed upon the part, is of a light-brown colour, and the diseased part projects more or less above the surrounding tissue, which, on careful examination, consists of a corky mass of cells covered by a lacerated greyish membrane. When it is fully developed as described above, it can be determined with certainty without a microscopic examination, but as it is much more difficult to determine in its earlier stages, being sometimes mistaken for citrus scab, it is perhaps better to describe more fully its special development on each part of the tree.

ON THE LEAVES.

1. Small, oily or watery dots, usually on lower leaf-surfaces, and darker green than rest of leaf.

2. Dots become convex and extend through leaf, appearing on upper surface as yellowish spots.

3. Convex spots develop until leaf-skin breaks and tissues are exposed, which become corky and darken with age.

Margin of spot at all stages has an oily appearance. Spots are always circular and vary from the very minute to one-quarter of an inch; often many spots fuse into one irregular mass. Cankers are elevated on both leaf-surfaces. As cankers develop, leaves fall off.

ON THE TWIGS AND BRANCHES.

1. Small, circular watery dots which rapidly enlarge, becoming blister-like.

2. Skin of bark breaks and exposes projecting cankerous tissue below.

3. Bark skin persists as greyish broken membrane at margin of canker.

Usually attacks young twigs, but larger branches are subject to infection and are often ringbarked by canker. Affected trees show stunted growth, with numerous unhealthy-looking shoots below affected part.

ON THE FRUIT.

Similar in appearance at first to leaf-cankers but much larger; usually circular and quite superficial; often unite to form large scaly areas which often burst open, when fruit becomes prematurely yellow and drops. All cankered fruit is most unsightly and unsaleable.

It is almost impossible to bud into stock that is affected, as canker starts where the bud is inserted.

Citrus canker is caused by a bacterial parasite named *Pseudomonas citri*, Hasse, and commonly associated with it is a fungus belonging to the genus *Phoma*; and these have been extensively studied, but without any success so far as regards prevention or cure.

The disease is one of the most infectious plant diseases known, as inoculation can be introduced by simply handling an affected part and then an unaffected one, the period of incubation being from seventy-two hours to ten days, varying with heat and moisture. As the disease passes its whole life-cycle within the tissue of the host plant, it will soon spread completely over a tree. It usually appears in the spring with the young growth, and it is thought that the organism is able to survive right through the winter on fallen leaves, so that it is easy to see that a few cankered leaves blown about will quickly infest a whole orchard, when also, as there is every reason to believe that it can remain alive a long time in the soil, it becomes obvious how extremely difficult it is to stop the infection spreading, and that there seems, too, no way of controlling it. The disease, too, is disseminated on the feet and body of birds and insects; in fact, practically anything touching a canker can spread the infection. Instances are on record of citrus-growers travelling to infected orchards to examine the disease and unwittingly bringing it back by brushing against trees which were infected. It is obvious, therefore, that this disease should be recognised and experts summoned to deal with it immediately upon its discovery, as many of the early steps taken to combat the disease in the Gulf States only spread it further afield.

There is no known method of controlling this disease. Sprays of all kinds were tried, but had no effect whatever, even when used strong enough to defoliate the trees; neither has any spray been found that will in any way protect healthy trees from infection. At present the remedy being used in infected areas is the drastic one of completely burning, even to the roots, every tree that is cankered, the work being done by experts, who are careful to do as little handling of infected parts as possible, special care being taken to prevent any infection being carried away. Whole citrus groves have been thus exterminated, and there is ground for thinking that it may be possible to exterminate canker in this way.

At present the disease has not spread to California, but when the infectious nature of it is fully realised, it is obvious that the embargo that the Federal authorities have placed on all citrus fruits, plants, and buds being imported here from Japan, America, and the Pacific Islands, is absolutely necessary, and no relaxation can be thought of until the pest is exterminated in the infested countries, as its introduction would probably wipe out the whole citrus industry in Australia.

Tropical Industries.

SISAL HEMP.

A few years ago it appeared as if the cultivation of sisal hemp was about to become one of the payable industries of Queensland. The demand for this fibre was very great in Europe, in the United States of America, and, to some appreciable extent, in Australia. The Department of Agriculture and the Home Secretary's Department took a great interest in the endeavour to establish the industry, by precept and example, as well as by an exhaustive pamphlet on the whole subject. The plant was established on the island of St. Helena, and small machinery was installed for extracting the fibre. Thousands of plants were distributed to farmers in most of the coastal districts, notably at Childers and in the Logan district. At that time the highest price obtained in the oversea markets for the fibre was £50 per ton, eventually gradually falling to £24 per ton. But sugar-growing and dairy-farming appealed more to farmers who preferred the annual and monthly cheques for their produce to a prospective larger return after waiting for three or four years for a first crop of sisal, although the subsequent returns annually for the latter showed, in the case of two or three small plantations, that sisal planting was a very payable business. Hence the cultivation of the plant was abandoned by all but two planters. The return from one of these plantations was 1¼ tons of fibre per acre, and the net profit thereon was £12 per ton. Only white labour was employed at regulation wages and hours of labour. At this time of writing, the price of the fibre is £60 per ton. As it can be produced under the conditions stated, the profit per acre would be from £40 to £48, exclusive of the value of the tow and the sale of plants. During the war, sisal hemp exports from Progreso, Mexico, dwindled until, in June last, it was announced that stocks in that country were exhausted, and now that Mexico is apparently on the eve of war with the United States, there is no hope of any hemp reaching Europe or the States thence for an indefinite period. Meanwhile British East African planters are reaping a rich reward for their enterprise, in which, for the present, they have no competition. With the cheap native labour of East Africa, the profit on a crop of sisal sold at £50 to £60 per ton is clearly very considerable, as compared with that of the Queensland planter, who, under present labour conditions, both in the field and in the factory, is under a great disadvantage as compared with labour in that country, notwithstanding which, large profits could now be made in this country had the cultivation of the sisal agave been extensively carried on during the past five years. The uses of sisal fibre are numerous, particularly for the wheat-growers, in the shape of binder twine; also for various descriptions of rope and other cordage. In some countries the plant is utilised for enclosing cultivation grounds, and forms a hedge impenetrable by cattle or other stock. The fibre derived from these hedges is extensively used for local agricultural purposes.

RUBBER.

Writing on the rubber famine in Germany, the "India Rubber World" has the following:—

When the war broke out German business circles recognised that the extraordinary conditions it created would have a far-reaching effect on the commercial and industrial life of the empire. But there still seem to be a good many people in Germany who have not yet been impressed with the changed conditions, and among them are quite a number of dealers in the rubber trade, who complain very loudly that the manufacturer does not turn out their orders as acceptably and as rapidly as he would in normal times. The rubber journals are taking these complainers to task, and seeking to convince them that under present trade conditions they should make all proper allowances for the extraordinary difficulties under which the manufacturer labours, and that they should not be too insistent on immediate deliveries or on getting exactly the quality at precisely the price mentioned in their orders.

The Allies' blockade is being felt more and more each day, and the list of rubber goods "no longer obtainable" is increasing constantly. Each day increases the inconveniences created by the lack of raw materials, and the discovery, or even the pretended discovery, of some new substitute for a scarce or "no longer obtainable" raw material is heralded throughout the Press. It was announced lately that the Kaiser had motored to the front in a machine equipped with artificial rubber tyres. Immediately the Press announced that the great problem had been solved, that artificial rubber was at last practicable, that Germany would no longer have to rely upon foreign countries for her crude rubber supplies. Rubber would now be home-made. It appears, however, now that the much-talked-of artificial rubber tyres of the Kaiser's automobile were only experimental ones, produced at a great cost, or at least at a cost that would prohibit their being produced on a commercial basis, or even on a basis permitting their use for the present military needs.

Another substitute that is receiving wide publicity in Germany appears to offer greater possibilities. It is known as "textilose," and is to be used as a substitute for the jute Germany formerly imported in great quantities from British India.

Textilose is made by spreading paper on a fibre gauze and cutting the product in strips, which are then spun into yarn and can be woven in a similar manner as other paper yarns. Two factories are said to be producing about 44,000 lb. of textilose bags per day, and it is also stated that over 40,000,000 marks (9,520,000 dollars) have been subscribed for the promotion of the manufacture of this jute substitute both in Germany and abroad.

When the war broke out there was a very large supply of cotton, and even after the beginning of hostilities, large quantities of raw cotton from time to time reached Germany. Manufacturers used freely of this supply, with the result that when the Allies tightened their effective blockade the supply of raw cotton was considerably depleted. Since

1st August the manufacture of cotton has been absolutely prohibited. The Government's order is far-reaching and strikes all kinds of goods made of cotton or containing any of this staple. Without distinction it prohibits the manufacture of all cotton yarns, cotton threads, fabrics, wearing apparel, bags, belts, and all woven or knitted goods containing cotton. Since 1st August it has been legal to use cotton only in the manufacture of military requisites. Long before the Government decided on these restrictions the price of raw cotton had reached the alarmingly high price of 30 cents. per lb. The efforts made to encourage the planting and harvesting of hemp and flax have not yet given any material result.

Another Government operation of great importance to the rubber industry is the recent seizure of all supplies of sulphur. However, the seizure of sulphur supplies is considered an advantage to the rubber trade, for the Government has promised to distribute sufficient quantities to answer the immediate needs of all.

Lubricating oil is becoming so scarce, and its price too high, that only few rubber manufacturers can afford to use it for their machinery. Even graphite, which is used as a substitute therefor, is becoming rare and expensive.

The Allies' blockade has created such a rubber, gutta-percha, and copper famine that the D.V.E. (Union of German Electrical Engineers), which fixes the standards for rubber and gutta-percha insulated wires, has been obliged to modify its standards to make their observance possible under present conditions. As far as possible iron will be used instead of copper, and rubber and gutta-percha insulations will be replaced by impregnated paper wherever practicable. In cases where impregnated paper cannot be used, reclaimed rubber will take the plac of the usual insulator until normal conditions are re-established.

The war has increased interest in farming here, and farmers, owing to lack of labour, are obliged to use modern machinery to a much greater extent than they formerly did. This creates an unusual domestic demand for many rubber mechanical articles, and especially for belts, in view of the fact that the use of leather for other than military purposes is strictly forbidden. But, because of the high cost of raw materials necessary for making these belts, it is almost impossible for manufacturers to make reasonable profits in producing these necessities. Of course, those who had a large stock of belts on hand are securing large profits, for farmers are glad to take what they can get, and are using all sorts of belts on their threshing machines and other agricultural implements.

Packings and the like that can easily be made of substitute materials are giving but little trouble. The hose industry, generally speaking, is dead. No orders are forthcoming; people who use hose are doing the best they can by keeping their old hose in repair.

Before the war, maritime as well as river navigation offered a great market for all sorts of mechanical rubber goods. River navigation is at a standstill through lack of freight and lack of hands; maritime navigation, as far as Germany is concerned, is stopped almost entirely by the activities of the Allies' fleets.

In a word, the rubber industry is badly affected by the war, and were it not for Government orders for tyres and other mechanical and surgical rubber goods, the whole industry would be at a dead standstill.

As an illustration of the thoroughness with which the Germans conduct their military operations, a paragraph in a letter recently written from Northern France is interesting. The writer says:—

"After every battle in which Germans have been victorious the field is literally scoured, and all the junk is transported to headquarters. Scores of ripped and torn auto tyres are collected and sent to an establishment where the rubber can be utilised in the making of new tubes."

The saving of every possible scrap of waste rubber has now become such an important matter in Germany that not only the Imperial Government but State and municipal authorities have taken the matter up; and the Red Cross organisation particularly is instructing the public in regard to collecting old rubber articles so that nothing shall be missed. The newspapers even go to the extent of giving general instructions as to how waste rubber articles shall be sorted before being turned over to the factories for use, so that the delay of re-classification be avoided.

On 1st June, Austro-Hungarian rubber manufacturers increased their prices of rubber goods from 50 to 100 per cent.

THE RICE FARMER.

It would appear that, consequent on Mr. T. F. Keane's success in rice-growing at Carbeen, Mareeba, North Queensland, a little more interest has been aroused amongst agriculturists in the Cairns district. Perhaps the following notes on rice-farming and rice farmers, published in one of our American exchanges, will be of value to present and future growers of this valuable crop, which supplies food to many millions of the inhabitants of the world:—

The fact that rice is the principal food for more than half the world answers two very practical questions—which of the cereals is the best food for the human race, and which is the most profitable for the husbandman to produce, taking a series of years? Rice would not bring a higher price than wheat, rye, or barley in the Orient unless it were in greater demand than those grains for the food supply, and this demand would not continue for thousands of years unless the shrewd Oriental found that rice, in proportion to its cost and the expenditure of vital force necessary to digest it, imparted more vigour to the system than any other grain.

On the other hand, Oriental farmers would not continue to raise rice on such vast areas unless it paid better than other crops. To pay better, it must be a more certain producer, a larger yielder, less subject to destruction by storms, diseases, or insect enemies, and must, on an average, bring better returns. Nothing is more erroneous than to suppose that the Japanese, Chinese, or Indian farmer is a stupid fellow who plants year after year the same grain because his father did so. There are no shrewder farmers on the globe than the Japanese and Chinese. They do things because it pays and they figure very closely. The man who has a well-improved rice farm with an abundant supply of fresh water is to be congratulated. He need not envy the owner of a Texas oil well nor the proprietor of a gold mine. However prosperous he may be, it is not safe to ignore certain fundamental principles in agriculture.

It is neither safe nor economic farming to produce only one crop and buy everything else necessary to the supply of the farm. One-crop farming is opposed to nature. The soil prefers a change and produces better under a rotation of crops. Safety and economy lie in producing upon the farm as many of the things demanded of the farm consumption as possible.

Generally, upon the rice farm, a small field may be found suited to the production of sugar-cane. A few barrels of open kettle sugar and molasses are valuable additions to the home.

No well regulated farm should be without plenty of cows. They utilise crops that would otherwise be waste, the rice straw and the after growth of the rice fields in the fall. The straw from an acre of rice, at a conservative estimate, is worth five dollars per acre for stock food.

The farmer who has 200 acres in rice and allows the straw to be burned does not realise that he has wantonly wasted 1,000 dollars.

The after growth of the rice fields in the fall is worth at least 1 dollar per acre annually. Here there is liable to be an additional loss of 200 dollars. The average crop of rice on 200 acres of land will furnish 30 tons of bran and pollard worth 350 dollars. Thus the farmer without cattle is annually donating to the wind 1,550 dollars from each 200 acres of rice.

No thrifty farmer can afford to do without hogs on the farm. They are the natural scavengers which convert waste into money. The great variety of root crops, leguminous plants, and rich grasses that can be produced in the South are evidence that swine farming will become one of the most profitable lines of industry on the Southern farm.

The rice farmer should produce the grain for the horses and mules.

Corn is a responsive crop if properly managed. There are varieties of soft rice which yield enormously and are excellent food for work animals.

A Southern farm without fruits ought to be an anomaly, when it is capable of producing so many luscious varieties. Fruits and flowers make home attractive and are significant that a higher civilisation has touched the soil. Soils are intelligent, and they know when a master mind is directing the implements of husbandry. They are afraid of the farmer who has fruits and flowers around his house and they try to do their best for him.

To speak plainly, the great majority of Southern rice farms lack the substantial improvements which indicate progressive farming and thrift. Here is a lack of permanency in the improvements; as if the farmers were renting or just ready to move.

VALUE OF RICE.

All the Government statistics of this staple have been taken with lowland rice as a basis; so little of the upland variety was grown in the rice-producing States that it cut no figure in the census. In Florida, however, there is hardly any other than the upland variety grown. The census taken by Commissioner Wombwell in 1899 showed an average yield of 20·36 bushels per acre, worth 1 dollar a bushel.

According to the reports of the Department of Agriculture, the yield of wheat in the United States averages very little, if any, above 13 bushels per acre. Wheat, No. 2 red, is worth at present in Chicago 68 to 68¼ cents a bushel. The acre of rice, therefore, is worth 20·36 dollars; the acre of wheat 8·87 dollars. The rice requires to be cultivated two or three times and takes twice the labour in threshing—at least unless rice-threshing machines are introduced—but to partly counterbalance this, rice rattoons and furnishes two or three months of excellent pasturage for milch cows, or working stock either. Wheat stubble is worth gleaning with a herd of swine, but the gleanings do not equal the value of the rice aftermath, and the straw of the threshed-out crops, which, if properly protected from the weather, may be cured into forage nearly as good as hay.

Wheat, rye, barley, and all the cereals except oats, may be cut, bound, and stacked or housed practically at one and the same time, for when the grain is ripe, the straw and roots are dead and dry. Oats, however, require some sun-drying in the swath. But rice is different. When the heads are ready for harvesting, the stalks are green and the roots still vigorous, ready to rattoon as soon as the stalks are harvested. Rice has to be sun-dried in the swath, and it ought also to be cured in the stack a week or more before it is stacked or housed; or else it will heat and "stack-burn" or "mow-burn," which tinges the grain yellow, and materially depreciates its selling value.

This accounts largely for the superior value of rice straw as a forage over that of wheat, rye, or other cereals except oats. The sooner the rice is harvested after the heads are fully matured, the better for the farmer, for two reasons in particular. First, the greener the the straw when cut, the better forage when cured, because containing the more nutritive sap; second, the sooner the first growth is cut, the better it will be for the rattooning process, and the greater amount of rich, nutritious feed it will produce.

The harvesting should be conducted with a view to the mode of threshing which is to be employed. If the crop is small and is to be threshed and cleaned by some manual process, as is generally the case in Florida, then the rice should be cut, laid, and bound as even and as straight as possible, taking care to have the heads all turned the same way, which will save much trouble and loss of time.

Rice should never be threshed immediately after harvesting; it should be stacked or housed for at least fifteen days. This causes it to undergo a sweat (not the destructive "mow-burn" which results when it is not dried in the swath)—and this sweat in the bulk is beneficial. It is considered by experienced planters that it hardens and whitens the grain. Hence, old rice-planters leave their rice stacked from two to four weeks before threshing.

A NEW INSECT PEST OF SUGAR-CANE.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following monthly report from Mr. E. Jarvis, Entomologist at Gordonvale:—

Experimentation against the grub form of albohirta having been discontinued owing to the commencement of the pupal stage of this insect more time has been available for outside field work, and the study of certain phases of the complex question of natural control, relating exclusively to conditions of a physical nature which no doubt influence the economy of cane-beetles very materially.

With reference to field observations, close examination of an extended area of young plant-cane in the neighbourhood of Gordonvale has resulted in the discovery of another insect pest of this plant, which, although of very minor importance, deserves recognition owing to its not having been hitherto recorded as injurious to sugar-cane in Queensland.

The insect in question is the well-known "Leaf butterfly" (*Melanitis leda* Linn.), ranging from Cape York to Sydney and occurring also in New Guinea and other countries. It measures about 3 in. across the extended wings, which are of a uniform chocolate-brown colour on the upper surface, merging into dull orange on the fore wings, which are deeply scalloped on their outer edges and ornamented with a conspicuous black eye-like blotch enclosing two large white spots.

The coloration of the lower surface varies from light to very dark purplish-brown, and is crossed by a few blackish lines resembling the veining of a leaf; while the outer angles of the hind wings are prolonged in the form of two short tails.

This butterfly, which affords a good example of protective coloration, does not fly far when disturbed, but seeks to escape notice by dodging about in an erratic manner for a short distance and then settling hurriedly on the ground or amongst withered leaves, &c., when it remains motionless, shutting its wings so as to expose to view only their leaf-like lower surface.

The deception is so clever that unless one's eye has followed the insect closely and watched it alight there is little chance of locating the specimen.

Knowing the larvæ to be grass feeders I was at first disposed to think their presence on cane leaves might be accidental, but later research having resulted in the discovery of both eggs and larvæ in widely separated plantations there can be little doubt that this butterfly, although of sparing occurrence in cane fields, breeds habitually in such situations.

The pretty pale-green eggs, which are spherical and 1 m.m. in diameter (scarcely 1/16 in.), resemble tiny glass beads, and are laid side by side on the under surface of the leaf-blade in batches of from 3 to 8.

The caterpillar is grass-green, sluggish in habit, and about 2 in. long; the body tapering slightly towards each extremity and presenting a rough appearance.

Owing to its colour, and custom of resting on the lower surface of leaves, it usually escapes detection, but when found is at once seen to differ from the larvæ of other cane pests in having two remarkable reddish or dark-brown horns rising vertically from the head, and a couple of pointed fleshy protuberances projecting horizontally from its hinder extremity.

A number of these strange-looking caterpillars were bred recently at the laboratory, and just prior to pupating suspended themselves by the tail-end to the under surface of cane leaves and roof of their breeding-cage.

The pupa is 1 in. in length, stoutly proportioned, and of a uniform lovely shade of pea-green.

This pest feeds openly, attacking the foliage only, and occasioning injuries very similar in general appearance to those inflicted by grubs of the common "army-worm" (*Leucania unipuncta*).

No parasites were bred, but several pupæ succumbed to what appeared to be a bacterial disease (not yet identified), which caused them to blacken and decompose a few days after pupation.

While dealing with the lepidopterous enemies of sugar-cane I may mention that several caterpillars of hesperid butterflies were collected this month from various plantations near Gordonvale.

The common "skipper" (*Paruara mathias*), figured in Bulletin No. 3 of this Bureau (p. 20, fig. 20), is evidently widely distributed in canefields, most larvæ collected being of this species.

The following notes on the life-history of mathias, supplementary to those given in the abovementioned bulletin, will be of interest:—Its egg is dull yellowish-white, dome-shaped, and deposited singly on the upper surface of cane leaves. The larvæ, in addition to being destroyed by a braconid wasp, are much infested by grubs of a tachinid parasite resembling a small house fly.

It was noticed that individual caterpillars contained from 2 to 4 of these parasitic grubs, which after devouring the fluid contents of their host crawled out of its body and pupated openly on the leaf-blade close to the empty skin.

No doubt this fly renders valuable assistance in checking the increase of *P. mathias,* and possibly other hesperids.

The second species found attacking cane this month was *Telicota augias-kreffti,* previously figured and described in Bulletin No. 3 of this Bureau (p. 20, fig. 21).

Botany.

ILLUSTRATED NOTES ON THE WEEDS OF QUEENSLAND.

No. 4.

ON TWO SPECIES OF GOMPHOCARPUS (WILD COTTON) NATURALISED IN QUEENSLAND.

BY J. F. BAILEY, Government Botanist, and C. T. WHITE, Assistant Government Botanist.

Of late numerous specimens have been received of *Gomphocarpus fruticosus* (R. Br.) and *G. physocarpus* (E. Mey.) for identification and report, so it seems advisable to publish the following information on these two very closely allied plants. Both species are here figured, and the accompanying plate should aid in their recognition. In most characters the two species are very similar, the chief distinction being in the fruits (follicles).

G. FRUTICOSUS:—Follicles 2-3 in. long, ovoid, tapering into a beak.

G. PHYSOCARPUS:—Follicles subglobose or obliquely ovoid, 1½-2½ in. diam., obtuse or slightly apiculate, more inflated than in *G. fruticocus.*

GOMPHOCARPUS FRUTICOSUS, R. Br.

WILD COTTON.

A shrub 3-6 ft. high, branches erect, puberulous. Leaves more or less ascending, lanceolate, 2-6 in. long, shortly stalked. Umbels lateral, 6-10 flowered, on peduncles of ¾-1½ in. Flowers white or cream-coloured, on stalks of ½-1 in. Follicles bladdery, beset with soft bristles, 2-3 in. long, ovoid, tapering into a beak. Seeds numerous, each with a tuft of white hairs at the apex.

A native of Africa, also found in the Mascarene Islands, Madeira, Canaries, Arabia, and Southern Europe, perhaps naturalised in some of these latter places. It has long been a naturalised weed in New South Wales, where it is generally known as Cape Cotton. In Queensland it was first recorded as naturalised in Botany Bulletin 5 (1892), and since that time had spread so rapidly as to become one of our worst weeds.

GOMPHOCARPUS PHYSOCARPUS, E. Mey.

WILD COTTON.

A shrub 3-6 ft. high, stems branched pubescent. Leaves ascending or spreading lanceolate, acute 2-5 in. long. Umbels lateral, 5-10 flowered on stalks of ½-1¾ in. long. Flowers white or cream-coloured on stalks ½-1 in. long. Follicles subglobose or obliquely ovoid, 1½-2½ in. diam., inflated, covered with long soft bristles. Seeds numerous each with a tuft of silky hairs at the apex.

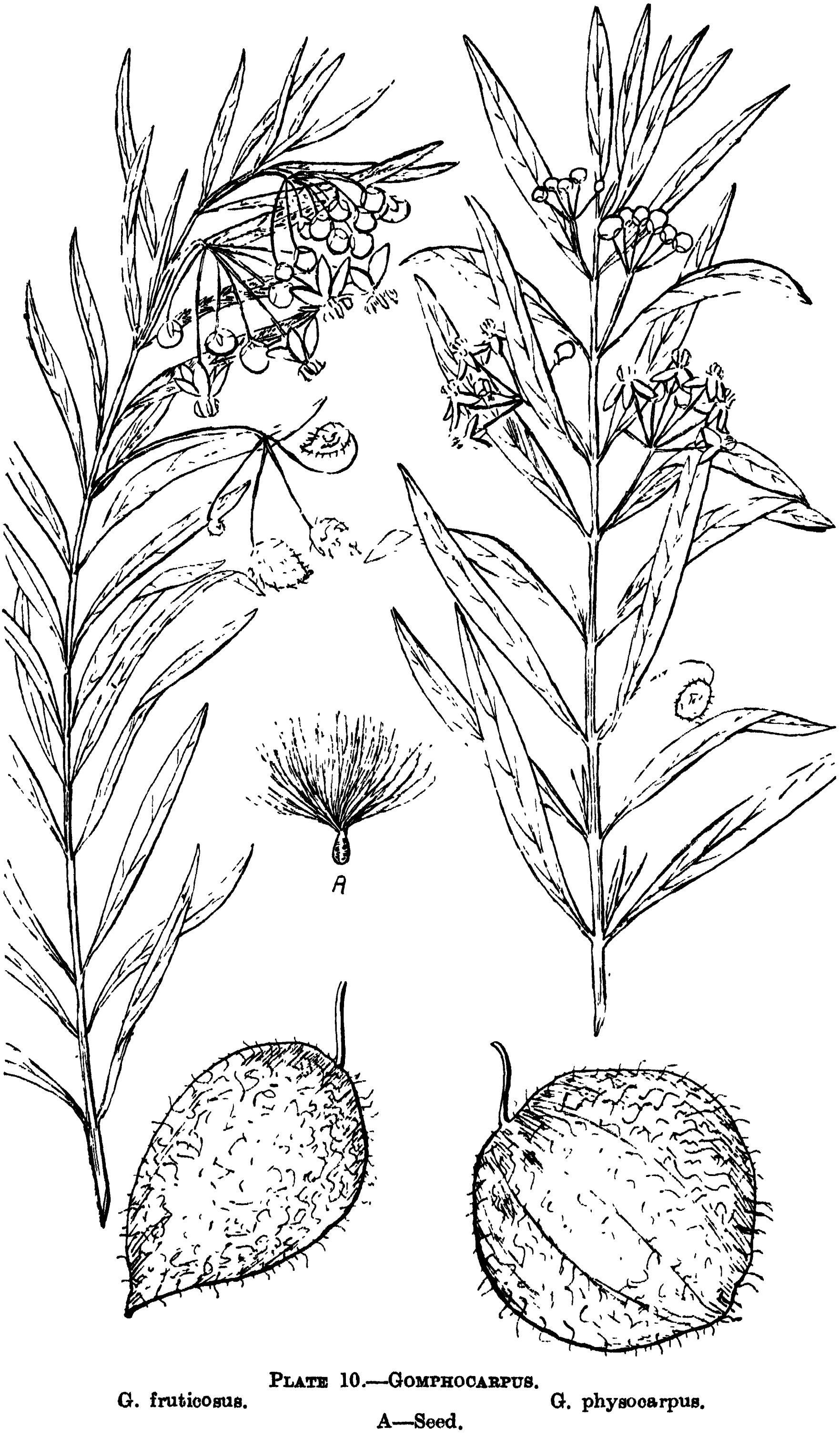

PLATE 10.—GOMPHOCARPUS.

G. fruticosus. G. physocarpus.

A—Seed.

A native of South and Tropical Africa and the Cape Verd Islands, it is here recorded for the first time as naturalised in Queensland; apparently it is not so common as *G. fruticosus.*

These plants have several times been suspected of causing losses amongst stock, and, as they belong to a dangerous family, the Natural Order Asclepiadeæ, this most likely has some foundation, but, though very common weeds, they seem to be seldom eaten by animals.

The question is often asked if the down or silk-cotton surrounding the seeds has any commercial value. It is of no use for textile purposes, the fibre being too short and brittle, and could only be used in the same way as kapok, but its collection for such a purpose would never be a payable proposition. The bark contains a fibre which is thought may yet prove of some value.

The genus GOMPHOCARPUS contains about 80 species and is merged by some modern writers into the older and larger genus ASCLEPIAS; as, however, the species under notice are much more generally known under GOMPHOCARPUS, it has been thought better to retain that name.

Eradication.—If plants are large and fruiting, cut off below the surface of the ground and burn when dry; if young hoe or pull them up.

TO WATERPROOF A COAT.

Take as much boiled oil as is necessary, and mix enough lamp black with it to blacken it. For yellow coats, use ground yellow ochre instead. Then lay the fabric on a smooth surface and put the oil on with a paint brush. Let the first coat get quite dry before applying another. Lay the oil on as thin as possible, or it will not dry. A little patent dryer will make it dry quicker, say ½ lb. to a gallon of oil. Three coats of oil are usually given. If the last coat remains sticky after it is dry, take 1 lb. shellac and simmer gently with 2 quarts of water, and when near boiling add a little liquor ammonia. If for a black coat, add a little lamp black to it when cold, and apply it to the coat with a sponge. In the case of a coat which lets the rain through only in places, one or two coats of oil may be enough. Patent dryers ready for use can be purchased at paint stores, and these can be recommended.—" Town and Country Journal."

Science.

A NEW AND PROLIFIC SOURCE OF GLYCERINE.

The "Mindanao Herald" (Philippes), of 20th May, published the following interesting account of the present position of the glycerine market and of the discovery which has lately been made of its occurrence in Lumbang oil.

GLYCERINE FROM BIAU OIL.

The "Weekly Drug Markets" (New York) of 24th November, states that owing to the war something like a glycerine famine exists at present in the United States.

Quite 60 per cent. of all glycerine used in America formerly came from Europe in a crude form. This avenue of supply has now been cut off by the embargoes of the warring Governments, a condition which is causing much concern, "as the home production of glycerine is entirely inadequate to meet the demands, and refiners have now on hand no more stock than can be exhausted in three to four months."

The world's output of glycerine is estimated at from 90,000 to 100,000 tons per annum, and it is almost exclusively a by-product industry of soap and candle manufacture. Glycerine is also a by-product of the alcoholic fermentation of sugar, but this source of supply is minimissimal compared with the amount obtained as by-product in first-mentioned industries.

Glycerine is used for many purposes, such as in the manufacture of leather, in spinning, weaving, dying, and calico printing, manufacture of waterproof paper, for filling gas meters and hydraulic jacks, in photography, in the manufacture of cast iron, &c., &c., but most important of all it is an indispensable factor in the manufacture of nitroglycerin, dynamite, and other high explosives.

Previous to the war crude glycerine had a market value of 10 cents. gold per lb., and refined glycerine a value of 20 cent. gold per lb. The price rose for crude glycerine in 1915 to 22 cents. gold per lb., and has since July last year suddenly risen greatly in value, the present price being 60 to 61 cents. gold per lb.

Glycerine is, in fact, a by-product of the palm oil gained from the African oil palm kernels, of which oil quite a large percentage of all the soap and candles manufactured in the world are made, and the crude glycerine is gained as a side-product during the process of manufacture. Until quite recently no trials were made with any of the other known vegetable oils to ascertain whether glycerine could be gained from them.

It was reserved for Mindanao to originate the first trial, and the result has proved very successful. That this trial was made is due to Mr. W. F. C. Asimont, the agent of the Department Governor, he having been first to recognise the possibility of gaining glycerine from the well-known Biau or Lumbang oil.

When Mr. Asimont visited Cotabato Province he found that Mr. A. J. Fenner, the analytical chemist and expert of Cotabato Oil Mills, was engaged on trials to manufacture a good soap from Lumbang nut oil, which trials proved most successful. On examining the detailed analysis made by Mr. Fenner of the Lumbang oil, Mr. Asimont noticed that it showed that the oil contains not less than 7·2 per cent. of glycerides, whereas the oil of the African oil-palm shows from 9 to 10 per cent. of glycerides.

He immediately drew the attention of Mr. Fenner to the possibility of gaining glycerine from Lumbang oil. His suggestion was followed out, and trials resulted in excellent crude glycerine being manufactured, samples of which have since been forwarded to Europe.

That this discovery may prove of very great commercial value and may greatly increase the value of the Biau nut is quite to be expected, and it is possible that at no distant date Biau nut oil will play a more important rôle in the market.

ROSELLA AND TOMATO VINEGAR.

A correspondent would be glad to obtain a reliable recipe for making the above.

We have received the recipes here given, but cannot give an assurance of their correctness:—

1. To every 8 or 10 gallons of rosella wine, add 2 to 3 spoonfuls of yeast. Place the cask in a warm spot, and in ten or fifteen days add a sheet of white blotting-paper smeared with molasses and torn into narrow strips. The paper is necessary to form the "mother" or life of the vinegar.

2. Rack off the wine and expose it to the air. Then take a vinegar cask and place in it a gallon of the strongest vinegar, such as Seppelt's, best white vinegar. Mix it with a gallon of your wine and let it remain two or three days; then add 1 gallon of wine daily till the cask is two-thirds full. Then stir it up and let it remain a few days till, by taste, you find it completely acidified. Now draw off the clear vinegar into another cask and start again, adding a gallon a day to the residue in the first cask. When the second cask is full put it in the open under the shade of a tree to mature for a few weeks, when you should have excellent vinegar.

3. We have not been able to obtain any recipe for making tomato vinegar.

General Notes.

THE WORKERS' COMPENSATION ACT OF 1916 IS NOW IN FORCE.

The Insurance Commissioner is now prepared to grant and issue Accident Insurance Policies for the purposes of the Act.

Application Forms may be obtained at the State Accident Insurance Office, Parbury House, Eagle street, Brisbane, and at any Railway Station or Government Savings Bank or from any Clerk of Petty Sessions.

Lodgment with or posting to the Insurance Commissioner of an application will act as a cover for the Policy applied for until the Policy is issued.

JOHN GOODWYN,
Insurance Commissioner.

State Accident Insurance Office,
Parbury House, Eagle street, Brisbane.

INFALLIBLE REMEDY FOR SEA-SICKNESS.

Sprinkle 2 or 3 drops of petroleum on a piece of lump sugar and eat, and the feeling of sickness will disappear immediately. This is not nearly so nasty as it seems, and I have never known it to fail. If a second dose is required, it may be repeated in about ten minutes, but the first is generally quite effectual.

A correspondent sends the above news par. It is easy to verify the statement.

Answers to Correspondents.

AREA OF AUSTRALIA AND NEW ZEALAND.

"INQUIRER," Brisbane—

State.	Area in Acres.	Area in Square Miles.
Western Australia	624,588,800	975,920
Queensland	427,838,080	668,497
South Australia	243,254,800	380,070
(Northern Territory)	335,116,800	523,620
New South Wales	198,848,000	310,700
Victoria	56,245,760	87,884
Tasmania	16,778,000	26,215
Commonwealth	1,902,670,240	2,972,906
New Zealand	66,861,440	104,471

USE OF EXPLOSIVES IN SUBSOILING CITRUS FRUIT TREES.

"PRO BONO PUBLICO," Palmwoods—

1. The best explosive to use is Nobel's Glasgow gelignite, on account of its wide wave of expansion.

2. The depth to which the explosive should be sunk for old trees depends on the nature of the soil. Roughly, however, from 2 ft. 6 in. to 3 ft. Be sure and use a sufficient quantity of explosive, say, at 3 ft., one and a-half plugs of inch gelignite to each hole.

3. The distance from the trunk at which the holes should be sunk rather depends on how the trees are planted. If in rows, it can often be done by placing holes about 9 ft. apart between them. It must be remembered that it is the smaller roots that principally supply the tree with its vitality, and these are usually further than that from the trunk. Should the trees be standing alone, place four holes about 7 to 8 ft. from the trunk, equi-distant apart all round it.

4. Apply to Brabant and Co., Brisbane, for their book on this work, by John F. Griffith, Nobel's expert in Queensland. You will find it useful.

5. If for some unknown reason young trees are not doing well, the explosive must be placed right under the tree at a depth of at least 3 ft. for trees up to 3 in. in diameter. It will often be found that one plug of gelignite at this depth is hardly sufficient, in which case put in a bit more. The trees will often jump two or three inches into the air. This will not hurt them in the least and the chances are 100 to 1 that they will grow, flower, and bear in a manner astonishing.

TO CORN BEEF.

"FARMER," Pittsworth—

An American recipe for corned beef says:—"The parts to be corned should be cut into pieces about 6 in. square. Try to cut the pieces all the same thickness in order to get an even layer when packing them in a jar or barrel. After the meat has been cut, weigh out about 10 lb. of common barrel salt for every 100 lb. of meat. Sprinkle a thin layer of salt into the bottom of the vessel and then pack a layer of meat. Sprinkle another layer of salt and then a layer of meat. Keep on in this manner until the meat is packed. Try to have enough saltpetre left from your brine mixture to cover the last layer. For every 100 lb. of meat packed weigh out 4 lb. of brown sugar, 4 oz. of saltpetre, and 2 oz. of baking soda. Dissolve this mixture in about 1 gallon of boiling water, and let stand until coloured; then pour it over the meat in the barrel. Add enough cold water to cover the meat and then weight the latter down by putting a round piece of clean board and a stone on top to keep all parts in the liquid. The object in using the ingredients mentioned is as follows:—The salt has an astringent effect, and will preserve the meat, but if used alone will harden the muscle fibre. The sugar is used to soften the muscle fibre, and at the same time to add flavour to the meat. The small amount of saltpetre is used to retain the natural red colour of the meat, which is destroyed if only salt and sugar are used. The baking soda will aid in keeping the brine sweet. Meat pickled in this way is ready to be used at the end of from 20 to 25 days, but should be left in the brine until used. The vessel with the meat should be kept in some cool place, as the sugar will have a tendency to ferment if it becomes too warm. In case the brine becomes thick and ropy it should be poured off, the meat washed with clean water, and a fresh brine put over it."

TO OBTAIN A RIGHT ANGLE.

"NEW CHUM," North Coast—

When building either a yard or laying a foundation for a home, all you have to do is to remember three figures, as we have pointed out in some of the earlier issues of this Journal, and now find in "The Farm," South Australia, as follows:—

"For those who are not acquainted with the fact, there is considerable difficulty in getting a right angle for building purposes or the making of yards. A very simple system can be adopted which will give you an accurate angle. The use of three measurements or any measurements of the same multiple will give you a correct angle. Six feet one way and 8 ft. the other at a right angle, will give you 10 ft. across from the two points, and by working on these figures, 6, 8, and 10, you always have a right angle where the six and eight meet. These figures are easily remembered, and the method easily adopted either by ordinary lining up of a building with a 10-ft. cross stick or by using a wooden angle of that size."

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JULY, 1916.

Article.		JULY. Prices.
Bacon	lb.	9d. to 11d.
Barley	bush.	...
Bran	ton	£5 15s.
Broom Millet	„	£37
Butter	cwt.	140s.
Chaff, Mixed	ton	£7 10s.
Chaff, Oaten	„	£6 to £7
Chaff, Lucerne	„	£7 to £8 10s.
Chaff, Wheaten	„	£6
Cheese	lb.	9¾d
Flour	ton	£12 5s.
Hams	lb.	1s. 3d. to 1s. 4d.
Hay, Oaten (Victorian)	ton	£7
Hay, Lucerne	„	£7 to £7 10s.
Honey	lb.	6d.
Maize	bush.	4s. 4d.
Oats	„	3s. 6d. to 3s. 11d.
Onions	ton	£6
Peanuts	lb.	2d. to 3d.
Pollard	ton	£7 5s.
Potatoes	„	£9 10s. to £12 10s.
Potatoes (Sweet)	cwt.	2s to 2s. 6d.
Pumpkins (Cattle)	ton	£1 7s. 6d.
Eggs	doz.	1s. 6d. to 1s. 8d.
Fowls	pair	5s. to 8s.
Ducks, English	„	4s. 6d. to 5s. 6d.
Ducks, Muscovy	„	7s. to 8s.
Geese	„	7s. to 8s. 6d.
Turkeys (Hens)	„	11s. to 12s.
Turkeys (Gobblers)	„	18s. to 22s.
Wheat	bush.	5s. 6d.

VEGETABLES—TURBOT STREET MARKETS.

Cabbages, per dozen	4s. to 7s. 6d.
Beans, per sugar bag	7s. to 9s.
Beetroot, per dozen bunches	9d. to 1s.
Carrots, per dozen bunches	6d. to 1s.
Cauliflowers, per dozen	6s. to 16s.
Chocos, per quarter-case	1s. 6d. to 2s.
Celery, per bundle	1s. 3d. to 1s. 9d.
Custard Marrows, per dozen	1s. 6d. to 3s.
Vegetable Marrows, per dozen	1s. 6d. to 3s.
Lettuce, per dozen	4d. to 9d.
Peas, per sugar bag	4s. to 9s.
Sweet Potatoes, per sugar bag	1s. 9d. to 2s. 6d.
Table Pumpkins, per dozen	2s.
Tomatoes, per quarter-case	4s. to 7s.
Turnips, per dozen bunches	4d. to 6d.
Rhubarb, per dozen bundles	8d. to 1s.

SOUTHERN FRUIT MARKETS.

Article.	JUNE.
	Prices.
Bananas (Queensland), per case	8s. to 20s.
Bananas (Fiji), per case	13s. 6d. to 15s.
Bananas (G.M.), per bunch	15s. to 17s. 6d.
Custard Apples, per tray	4s. to 6s.
Mandarins, per case	6s. to 10s.
Mangoes, per case	...
Oranges (Navel), per case	10s. to 13s.
Oranges (other), per case	6s. to 8s.
Passion Fruit, per half-bushel case	4s. to 6s.
Lemons (Local), per bushel case	7s. to 11s.
Papaw Apples, per double-case	7s. to 10s.
Persimmons, per half-case	...
Pineapples (Queens), per double-case	6s. to 9s.
Pineapples (Ripleys), per double-case	4s. to 7s.
Pineapples (Common), per double-case	5s. to 6s. 6d.
Tomatoes, per quarter-case	5s. 6d. to 7s. 6d.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	JULY.
	Prices.
Apples, American, per case	7s. 6d. to 9s.
Apples, Cooking, per quarter-case	6s. to 7s. 6d.
Bananas (Cavendish), per dozen	2d. to 5½d.
Bananas (Sugar), per dozen	1¾d. to 3d.
Citrons, per cwt.	10s.
Cocoanuts, per sack	12s. to 15s.
Custard Apples, per quarter-case	3s. to 4s. 6d.
Granadillas, per quarter-case	...
Lemons (Lisbon), per case	6s. to 11s.
Lemons (Italian), per case	...
Limes, per quarter-case	...
Mandarins (Local), per half-case	10s. to 16s.
Mangoes, per case	...
Oranges, (Navel), per case	9s. to 11s.
Oranges (other), per case	5s. to 8s.
Oranges (Seville), per cwt.	10s.
Papaw Apples, per quarter-case	1s. 3d. to 2s.
Passion Fruit, per quarter-case	4s. to 6s. 6d.
Peaches, per case	...
Pears, per half-bushel case	7s. to 11s.
Peanuts, per pound	2d. to 3d.
Persimmons, per quarter-case	...
Plums, per case	...
Pineapples (Ripleys), per dozen	2s.
Pineapples (Rough), per dozen	9d.
Pineapples (Smooth), per dozen	1s. to 1s. 3d.
Quinces, per case	...
Rockmelons, per dozen	...
Rosellas, per sugar-bag	1s. to 2s.
Strawberries, per dozen boxes	5s. to 10s.
Tomatoes, per quarter-case	3s. to 6s. 3d.
Piemelons, per cwt.	7s.
Watermelons, per dozen	...

TOP PRICES, ENOGGERA YARDS, JUNE, 1916.

Animal.	JUNE.
	Prices.
Bullocks	£15 10s. to £19
Bullocks (Single)	£21
Cows	£9 17s. 6d. to £12 15s.
Merino Wethers	29s.
Crossbred Wethers	35s. 6d.
Merino Ewes	23s. 3d.
Crossbred Ewes	30s. 6d.
Lambs	25s. 9d.
Pigs (Porkers)	...
Pigs (Slips)	...

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JUNE IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JUNE, 1916 AND 1915, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	June.	No. of Years' Records.	June, 1916.	June, 1915.
North Coast.	In.		In.	In.
Atherton	1·85	15	0·51	0·61
Cairns	2·92	34	2·21	2·16
Cardwell	2·13	44	1·00	1·19
Cooktown	2·10	40	1·47	2·06
Herberton	1·04	29	0·30	0·66
Ingham	2·53	24	1·88	0·33
Innisfail	7·27	35	3·39	6·35
Mossman	1·56	4	1·45	0·60
Townsville	1·39	45	0·26	0·02
Central Coast.				
Ayr	1·44	29	0·11	Nil
Bowen	1·69	45	0·33	0·20
Charters Towers ...	1·52	31	0·16	Nil
Mackay	2·80	45	1·81	0·56
Proserpine	4·31	13	1·56	1·50
St. Lawrence ...	2·60	45	0·92	0·11
South Coast.				
Biggenden	1·91	14	2·54	0·47
Bundaberg	2·89	33	3·33	0·58
Brisbane	2·66	65	2·79	1·44
Childers	2·36	21	2·73	0·26
Crohamhurst ...	4·43	23	3·06	0·78
Esk	2·05	29	2·36	0·65
Gayndah	1·87	45	2·21	1·47
Gympie	2·58	46	1·86	0·29
Glasshouse M'tains	4·52	8	2·88	0·23
Kilkivan	2·03	37	1·96	Nil
Maryborough ...	2·93	45	3·14	0·82
South Coast— continued:	In.		In.	In.
Nambour	3·59	20	2·57	0·61
Nanango	2·00	34	2·37	0·26
Rockhampton ...	2·12	29	1·80	Nil
Woodford	2·71	29	2·24	0·20
Darling Downs.				
Dalby	1·65	46	2·80	0·34
Emu Vale	1·32	17	1·72	0·42
Jimbour	1·49	24	2·45	0·27
Miles	1·99	31	2·95	0·22
Stanthorpe ...	1·79	43	3·13	0·91
Toowoomba ...	2·35	44	3·52	0·67
Warwick	1·67	29	2·01	0·67
Maranoa.				
Roma	1·68	42	3·11	0·15
State Farms, &c.				
Bungeworgorai ...	2·05	4	3·07	0·03
Gatton College ...	1·72	17	1·95	0·05
Gindie	1·67	17	1·29	Nil
Hermitage ...	2·07	10	1·95	0·40
Kairi	1·04	4	0·34	1·15
Kamerunga ...	2·72	26	0·95	1·99
Sugar Experiment Station, Mackay	2·55	19	2·10	0·42
Warren	2·47	4	1·82	Nil

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for June this year and for the same period of 1915, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
Divisional Officer.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET AT BRISBANE AND THE PHASES OF THE MOON FOR THE SECOND FOUR MONTHS OF 1916

Date.	May.		June.		July.		August.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·14	5·16	6·31	5·0	6·40	5·3	6·30	5·18
2	6·14	5·15	6·31	5·0	6·40	5·4	6·30	5·18
3	6·15	5·14	6·32	5·0	6·40	5·4	6·29	5·19
4	6·15	5·13	6·32	5·0	6·40	5·4	6·29	5·20
5	6·16	5·13	6·33	5·0	6·40	5·4	6·28	5·20
6	6·17	5·12	6·33	5·0	6·40	5·5	6·28	5·20
7	6·17	5·12	6·34	5·0	6·40	5·5	6·27	5·21
8	6·18	5·11	6·34	4·59	6·40	5·6	6·26	5·21
9	6·18	5·10	6·35	4·59	6·39	5 6	6·25	5·22
10	6·19	5·10	6·35	4·59	6·39	5·7	6·24	5·23
11	6·19	5·9	6·35	4·59	6·39	5·7	6·23	5·23
12	6·20	5·9	6·35	4·59	6·39	5·7	6·22	5·24
13	6·20	5·8	6·36	4·59	6·39	5·8	6·21	5·25
14	6·21	5·8	6·36	4·59	6·39	5·8	6·20	5·25
15	6·21	5·7	6·36	4·59	6·39	5·9	6·19	5·26
16	6·22	5·7	6·37	4·59	6·38	5·9	6·18	5·26
17	6·22	5·6	6·37	4·59	6·38	5·10	6·17	5·26
18	6·23	5·6	6·38	5·0	6·37	5·10	6·17	5·27
19	6·24	5·5	6·38	5·0	6·37	5·11	6·16	5·27
20	6·24	5·5	6·38	5·0	6·36	5·12	6·15	5·28
21	6·25	5·4	6·38	5·0	6·36	5·12	6·14	5·28
22	6·26	5·4	6·39	5·1	6·36	5·12	6·13	5·28
23	6·26	5·3	6·39	5·1	6·35	5·13	6·12	5·29
24	6·27	5·3	6·39	5·1	6·35	5·13	6·11	5·29
25	6·27	5·2	6·39	5·1	6·34	5·14	6·10	5·30
26	6·28	5·2	6·39	5·1	6·33	5·15	6·9	5·30
27	6·28	5·1	6·40	5·2	6·33	5·15	6·8	5·30
28	6·29	5·1	6·40	5·2	6·32	5·16	6·7	5·31
29	6·29	5·1	6·40	5·2	6·32	5·16	6·6	5·31
30	6·30	5·0	6·40	5·3	6·31	5·17	6·5	5.32
31	6·30	5·0	...	...	6·31	5·17	6·4	5·32

The Phases of the Moon commence at the times stated on or near the 150th Meridian, East Longitude.

			H.	M.	
2 May	●	New Moon	3	29	p.m.
10 „	☾	First Quarter	6	47	„
18 „	○	Full Moon	12	11	a.m.
24 „	☽	Last Quarter	3	16	p.m.

The moon will be farthest from the earth on the 7th, and nearest on the 19th.

1 June	●	New Moon	5	37	a.m.
9 „	☾	First Quarter	9	59	„
16 „	○	Full Moon	7	42	„
22 „	☽	Last Quarter	11	16	p.m.
30 „	●	New Moon	8	43	„

The moon will be farthest from the earth on the 4th, and nearest on the 16th at midnight.

8 July	☾	First Quarter	9	55	a.m.
15 „	○	Full Moon	2	40	„
22 „	☽	Last Quarter	9	33	„
30 „	●	New Moon	12	15	p.m.

The moon will be nearest to the earth on the 15th, and farthest from it on the 28th.

7 Aug.	☾	First Quarter	5	6	p.m.
13 „	○	Full Moon	10	0	p.m.
21 „	☽	Last Quarter	10	52	„
29 „	●	New Moon	3	25	a.m.

The moon will be nearest to the earth on the 12th, and farthest from it on the 25th.

A partial eclipse of the moon will occur on 15th July at 2 30 p.m., when the moon will be below the horizon in Australia.

An eclipse of the sun will take place on 30th July. It will be partial only in Queenslamd but annular, or leaving the edge of the sun visible as a magnificent golden ring at Adelaide, and in a line across the south-west of Australia.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise and sunset are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during May, June, July, and to the middle of August may be roughly arrived at by adding 20 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

Farm and Garden Notes for September.

FIELD.—Spring has now arrived, and with it there will be the usual trouble with weeds, especially on carelessly prepared ground. Therefore, the cultivator and the horse and hand hoe must be kept vigorously at work to check the weed pests and save the growing crops as well as much future labour. Attend to earthing up any crop which may require it. There may possibly occur drying winds, dry weather, and even very late frosts, which have not been unknown in parts of this State even as late as September. Still, good showers may be looked for in October, and much useful work may be done during the present month which will go far to afford a fair prospect of a good return for labour. Plant out *Agave rigida,* var. Sisalana (sisal hemp plant), in rows 6 to 8 ft. apart, according to the richness of the soil. All dry places on the farm, too rocky or too poor for any ordinary crops, should be planted with this valuable aloe. Especially should limestone country be selected for the purpose. If the soil is very poor, and the plants very small, it is better to put the latter out into a nursery of good soil, about 1 ft. apart. Next year they will be good-sized plants. Keep down tall weeds in the plantation, and do not allow couch or buffalo grass to grow about the roots. Sisal will do no good if planted on low-lying wet land, or on a pure sandy soil. It thrives best where there is plenty of lime, potash, and phosphoric acid, all of which (except potash, unobtainable under present war conditions) can be cheaply supplied if wanting in the soil. Sisal requires so little labour from planting to maturity that it can be grown to good profit despite the high cost of white labour. The price of the fibre now ranges from £50 to £60 per ton for British East African, the Mexican being unobtainable. Sow cotton—Sea Island near the coast, and Uplands generally. Caravonica succeeds best in North Queensland. Sow maize, sorghum, imphee, mazzagua, Indian cane, prairie grass, Rhodes grass and paspalum, panicum, tobacco, pumpkins, and melons. Sugar-cane planting should be vigorously carried on. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, ginger, and canaigre, the latter a tuber yielding a valuable tanning substance. Plant out coffee.

KITCHEN GARDEN.—Now is the time when the kitchen garden will richly repay all the labour bestowed upon it, for it is the month for sowing many kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost. Failing a sufficient supply of these, artificials may be used with good results. Dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and in the latter case, stir the soil early next day to prevent caking. Mulching with straw, leaves, or litter will be of great benefit as the season becomes hotter. It is a good thing to apply a little salt to newly dug beds. What the action of salt is, is not exactly known, but when it is applied as a top dressing it tends to check rank growth. A little is excellent for cabbages, and especially for asparagus, but too much renders the soil sterile, and causes hardpan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean delights in the hottest weather. Sow the dwarf kinds in drills 3 ft. apart and 18 in. between the plants, and the climbing sorts 6 ft. each way. Sow Guada bean, providing a trellis for it to climb on later. Sow cucumbers, melons, marrows, and squash at once. If they are troubled by the red beetle, spray with Paris green or London purple. In cool districts, peas and even some beetroot may be sown. Set out egg plants in rows 4 ft. apart. Plant out tomatoes 3½ ft. each way, and train them to a single stem, either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, chicory, eschalots, cabbage, radishes, kohl-rabi, &c. These will all prove satisfactory, provided the ground is well worked, kept clean, and that water, manure, and, where required, shade are provided.

FLOWER GARDEN.—Continue to plant bulbs as directed last month. Protect the plants as much as possible from cold westerly winds, which may still occur, notwithstanding the increasing temperature. Be careful that the bulbs do not come in contact with fresh manure. Keep a good lookout for slugs. Plant out chrysanthemums, palms, and all kinds of tropical and semi-tropical plants. If hot weather should ensue after planting, water and shade must be given. Sow dianthus, snapdragon, and coleus, seed or cuttings of the latter. Roses will now be in full bloom. Keep them free from aphis, and cut off all spent blooms. This latter work should be done in the case of all flowers. If you wish to save seeds, do not wait for the very last blooms, but allow some of the very best to go to seed. If you have any toads in the garden or bush-house, encourage them to take up their abode there. They are perfectly harmless, in spite of their ugliness, and they destroy an astonishing number of insects injurious to plants. Fill up all vacancies with herbaceous plants. Sow zinnia, gaillardia, amaranthus, cockscomb, balsam, sunflower, marigold, cosmos, summer chrysanthemum, coreopsis, portulaca, mesembryanthemum, calendula, &c.

Orchard Notes for September.

THE SOUTHERN COAST DISTRICTS.

The marketing of citrus fruits, in the later districts, of the late winter or early spring crop of pines and bananas, also of strawberries and Cape gooseberries, will continue to occupy the attention of fruitgrowers. We can only repeat the advice we have so often given in these Notes respecting the marketing of all kinds of fruit—viz., to grade the fruit evenly, pack honestly, and display it to the best advantage if you want to get good returns.

September is a very important month to the fruitgrower, owing to the fact that it is usually a dry month, and that it is essential in all cases to keep the land in a high state of tilth, so as to retain the moisture that is required by the various trees that are in blossom, thus securing a good set of fruit. Where irrigation is available, it is advisable to give the trees a good watering should the ground be dry, as this will induce a good growth and cause the fruit to set well. If an irrigation is given, it should be a thorough one, not a mere surface watering, and once the land is saturated the moisture must be retained in the soil by constant and systematic cultivation. If this is done, one good watering will usually be enough to carry the trees through in good condition to the thunderstorms that come later or even to the summer rains, if the soil is of a deep sandy loamy nature.

No weeds must be allowed in the orchard or vineyard at this time of the year, as they are robbing the trees and plants of both the water and plant food that are so essential to them at this period of their growth.

There is not much to be done in the way of fighting scale insects during the month, as they are more effectually dealt with later on; but where young trees are showing signs of distress, owing to the presence of scale insects, they should be treated, the gas method being the most efficacious.

Beetles and other leaf-eating insects often make their appearance during the month. The best remedy is to spray the trees or plants with one or other of the arsenical washes that are recommended by me in this journal. The vineyard will require considerable attention. Not only must it be kept well worked, but any vines that are subject to the attack of black spot must be sprayed from time to time with Bordeaux mixture. Disbudding must be carefully carried out, as this work is equally as important as the winter pruning, as it is the best means of controlling the future shape of the vine. A very common fault with vines grown in the coast districts is that the buds often remain dormant, only the terminal bud and possibly one other starting into growth, thus leaving a long bare space on the main rods, which is undesirable. When this takes place, pinch back those shoots that have started, and which are taking the whole of the sap, and force the sap into the dormant buds, thus starting them into growth. This will result in an even growth of wood all over the vine—not a huge cane in one part and either a stunted growth or dormant buds on the rest.

Every care should be taken during the month to prevent the fruit-fly from getting an early start. All infested oranges, loquats, kumquats, or other fruits should be gathered and destroyed, as the keeping in check of the early spring crop of flies, when there are only comparatively few to deal with, will materially lessen the subsequent crops. Land that is to be planted to pines or bananas should be got ready now, though the planting need not be done till October, November, or even later. Prepare the land thoroughly; don't scratch the surface to the depth of a few inches, but plough as deeply as you have good surface soil, and break up the subsoil as deeply as you can possibly get power to do it. You will find that the extra money expended will be a profitable investment, as it will pay every time.

THE TROPICAL COAST DISTRICTS.

September is usually a very dry month, and fruit trees of all kinds suffer in consequence. The spring crop of citrus fruits should be harvested by the end of the month, as, if allowed to hang later, there is a great risk of loss by fly. The fruit should be well sweated, and, if carefully selected, well-graded, and well packed, it should carry well to, and fetch high prices in, the Southern States, as there are no oranges or mandarins grown in Australia that can excel the flavour of the best of the Bowen, Cardwell, Cairns, Port Douglas, or Cooktown fruit.

As soon as the fruit is gathered, the trees should be pruned and sprayed with the lime and sulphur wash, as this wash is not only a good insecticide, but it will keep down the growth of all lichens, mosses, &c., to which the trees are very subject.

Every care should be taken to keep down the crop of fruit-fly during the month. All infested fruit should be gathered and destroyed, particularly that in or adjacent to banana plantations. Watch the banana gardens carefully, and keep well cultivated. New land should be got ready for planting, and where land is ready planting can take place.

Papaws and granadillas are in good condition now, and, if carefully gathered and well packed in cases only holding one layer of fruit, they should carry well to the Southern markets if sent in the cool chamber.

THE SOUTHERN AND CENTRAL TABLELANDS.

Prune grape vines at Stanthorpe in the early part of the month, leaving the pruning as late as possible, as the object is to keep the vines back in order to escape damage from late spring frosts. All vines subject to the attack of black spot should be treated with the winter dressing when the buds are swelling; this treatment to be followed by spraying with Bordeaux mixture later on.

Where fruit trees have not received their winter spraying, they should be treated at once before they come out into flower or young growth. Where the orchard or vineyard has not been ploughed, do so, taking care to work the land down fine as soon as it is ploughed, so as to keep the moisture in the soil, as the spring is always the trying time for fruit trees.

Look out for fruit-fly in the late oranges and loquats in the Toowoomba district. Keep the orchards and vineyards well cultivated; disbud the vines when sufficiently advanced. Spray for codlin moth.

In the Central tablelands irrigate vines and fruit trees, and follow the irrigation with deep, constant, and systematic cultivation. Keep down all weed growth, and fight the red scale on citrus trees with cyanide. The objective of the fruitgrowers throughout Queensland during September and the following months is, "How best to keep the moisture in the soil that is required by the trees, vines, plants, and vegetables"; and this objective can only be obtained by irrigation where same is available, or by deep, systematic, and constant cultivation where there is no water available for irrigation.

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Agriculture.

REPORT ON A VISIT TO MR. J. H. EVANS'S FARM, ST. CLAIR, WALLUMBILLA.

BY R. E. SOUTTER, Manager, State Farm, Bungeworgorai, Roma.

Mr. Evans's property is situated about 16 miles north-west from Wallumbilla, on the Blythdale Creek. It comprises 1,280 acres, the major portion of which is ridgy country, good (sweet) grazing country, and the balance low creek country. The property was selected five years ago; it is now subdivided into a number of paddocks, a nice residence has been erected, also the necessary outbuildings and yards for dairying, &c. A large area has been cleared on the flat lands adjacent to the creek, the whole of which at the time of my visit was under crop, 7 acres being devoted to vegetables, the balance winter cereals.

Mr. Evans has grown vegetables successfully every year since he has been there, 1915 included. This season he expects to clear £200 from

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these crops alone. He has approximately 30,000 cabbages, the saleable ones of which will bring in an average price of 5d. apiece. They are well grown, many being over 10 lb. in weight, without being coarse. Cauliflowers, of which there are about 5,000, look promising, and an average return of 6d. per head is expected for these. Turnips grow exceedingly well, white, as well as Swede reaching 20 lb. in weight, being solid and devoid of fibrous matter, and of excellent flavour when cooked.

Other crops growing to perfection were beetroot, mangels, carrots, eschalots, &c.

Potatoes have also done well this season, half an acre of blueskins yielding a return of 15 bags of commercial potatoes and 5 bags of seed.

The soil on the area devoted to the foregoing consists of a light, sandy loam, about 5 ft. in depth, overlying white sand—an alluvial formation.

The light nature of the country will no doubt render the application of fertilisers in the not very distant future necessary under consistent cropping, but in the endeavour to postpone this as long as possible green manuring and rotation cropping are being practised.

In the production of the crops the following methods are adopted:—

Immediately a crop is removed the land is ploughed and harrowed or cultivated as required in order to conserve the moisture. At seeding time, usually about February or March, the ground is ploughed with a double furrow plough, which has affixed to it a piece of wood so shaped as to make the drills. The seeds (cabbage and cauliflower) are sown in these by hand, being covered by dragging from the middle a long stick with a sufficient length of chain attached to form a big loop. No after cultivation is given, only thinning where necessary. The whole cost incurred in producing, including seed, was £15.

Mr. Evans states that he does not consider that the growing of cabbages and cauliflowers would be a paying proposition if they had to be transplanted.

There is a fairly large area of similar land in the district which, with the same methods, can be made as fruitful, as others who are growing similar crops can testify.

At the present time a good deal of this class of produce is being despatched from Wallumbilla west and east, and this business is increasing every season.

RURAL HIGHWAYS IN CANADA.

From the "Agricultural Gazette" of Canada.

No peaceful movement has made more rapid strides in Canada than the improvement of rural highways. Whereas, up to a dozen years ago, a comparatively insignificant amount was expended on country roads, other than the main or trunk roads, there has in recent years been spent in construction and maintenance about $50,000,000. While the farm had plenty of help, slow travel and small loads did not matter, but when every hour and every dollar must be conserved to meet the requirements of the times, a smooth, hard road at all seasons of the year is demanded by the rural dweller as by the urban citizen accustomed to motor travel. The motor influence has been characterised the nurse, if not the parent, of the good roads movement.

Nor is the extensive use of the automobile confined to the city man. The driving horse and covered buggy and the market conveyance on the farm are being substituted by the motor-car and truck, with the result that not only good but best roads are demanded alike by all classes of the community and in every province in Canada. But it is to the farmer that the matter of the roadway is pre-eminently important. To him it means independence of the railways in some measure, early arrival at the market, ability to transport his produce at all seasons, and freedom from vehicular trouble. With improved roads he will be able to cover twice the distance with half the effort he now exercises. They will also, by affording better facilities for reaching schools, be a practical aid to education.

Following the lead of individual good roads crusaders, associations have been formed in every province. These have merited and secured Government recognition, and have greatly assisted the respective Governments in formulating and carrying out the policies that are now working a revolution in rural highways. And since each province has worked out its own organisation according to local needs, each is dealing with the matter in its own way. In order that these several policies may be compared, a responsible official (the road-master) in each of several provinces is appointed to see that the provisions of the law are complied with.

In the June issue of the above "Gazette," statements prepared by the chief road officials of the various provinces of the Dominions are published, outlining the policies pursued and setting forth the legislation under which the roads are maintained, and the organisation for carrying on the work.

From amongst these statements we take the following:—

PRINCE EDWARD ISLAND.

"By the Road Act of 1812 each of the 470 school districts in the province was constituted a road district with a average road mileage of 7·6.

The roads in each district are looked after by a road-master appointed by the Lieutenant-Governor in Council. On or about the 15th of March, each road-master makes out a list of all persons within the district liable to pay road tax, setting forth the amount payable by each. and about the 1st of April serves each person with a notice of his liability, which person can, within a week, elect to commute the payment of same by rendering personal service, or service by a substitute, or to pay cash.

The tax consists of $1·50 levied on each person between the ages of 21 and 65, also 40c. for each horse owned over three years of age, $1 for each dog, and $3 for each bitch.

For labour in commutation of tax a man is allowed $1·50 per day and for a horse 75c.

Those wishing to perform statute labour are summoned by the road-master on twenty-four hours' notice to meet him and to work upon the highways and bridges at such different days, and in such groups as he may think proper, subject, however, to the approval of the Commissioner of Public Works.

A full return of all taxes levied, received, and expended is made by the road-master to the Commissioner of Public Works, and also a report on the condition and requirements of the roads and bridges within his district, and an estimate of cost of repairs and improvements, and of the taxes for the ensuing year.

Emergency repairs needed in any district are reported at once to the Commissioner of Public Works by the road-master. If considered necessary, the place is visited by the engineer, who advises and specifies as to work requiring to be done, which work is usually sold by public auction to the lowest bidder, but may be done by day labour. The building of bridges and new roads, and the carrying on of larger improvements on the roads, is done directly by the Commissioner of Public Works, on the recommendation of the provincial engineer, the cost being a charge on the provincial revenue. The road tax is only about sufficient for road maintenance such as can be accomplished by road machines and road drags. These machines are supplied by the department to the road-masters, who furnish the men and horses necessary for their working.

The policy of the Government has been to rebuild bridges with permanent structures of steel or concrete, and to replace the small wooden culverts with concrete pipe. An approximate estimate of the proportionate number of bridges and culverts thus permanently built would be about 10 per cent.

In the way of improved roads, attention is being given to the building up and draining of low roads, to the improvement of grades on hills by cutting down or opening roads around, and all with a view to afford a foundation for the harder wearing surface which will eventually come. The expenditure for the year 1915 was $36,000 from road tax, and from provincial revenue on roads $33.500, and on bridges $53,000.

NOVA SCOTIA.

The principle at the basis of all the early road legislation in this province was that the laying out and maintenance of the highways was a municipal affair. The roads were laid out under commissioners appointed by the county councils, and maintained by statute labour. Although the later Acts have placed the subject matter of roads to a large extent under the control of a provincial department, the idea of municipal maintenance by statute labour has not been entirely abandoned. Under the legislation at present in force (Acts 1907, Chapter 2) an official of the Department of Public Works and Mines, called the Road Commissioner, has general supervision over the building and maintenance of roads and bridges. He controls the expenditure of all road moneys appropriated by the Provincial Legislature. In each municipality, inspectors of roads and bridges are appointed by the Lieutenant-Governor in Council, on the recommendation of the Road Commissioner. It is the duty of each of these municipal inspectors to report to the Commissioner as to the condition and requirements of the roads within his territory, and to make estimates of the cost of proposed or necessary improvements. Every inspector also divides the municipality under his charge into road districts, and appoints road-masters for each district. These road districts for the most part correspond with the polling divisions. It is the duty of every road-master to report to the inspector as to the requirements, and to direct and supervise the expenditure on the roads within his district.

In addition to such sums as may be appropriated by the Legislature for road expenditure, there is also legislation (Acts 1908, Chapter 4) under which a poll tax is payable by all residents of the municipality. It is also provided by such legislation that all property within the municipality shall be rated for the maintenance of the roads within the road section in which the owner of the property resides. The boundaries of the road sections within each municipality are fixed by the municipal council. The fund raised by these methods (that is, the poll tax and the municipal road tax) is administered by officials appointed by the municipal council, called surveyors of highways. One such surveyor is appointed for each road section, whose duty it is to collect the municipal road taxes and expend the same "in a judicious and economical manner," and to superintend the sectional work performed on the roads. Some unity in the administration of the road funds is sought by providing that the road-masters appointed by the provincial inspectors may be the same persons as are appointed surveyors by the municipal councils.

The tendency of later legislation has been towards bringing the expenditure on the roads under provincial administration. The Legislature in 1912 and 1913 provided a sum of $600,000 for smaller bridges and culverts to be built of permanent material; also, in 1913, provision was made that an allotment of $10,000 in each of the eighteen counties of the province should be expended for improvement on main through highways and important laterals, and also that the annual fees received for the registration of motor-cars should be expended in road improvement. There had been expended to the close of the year 1915 $154,000, and of the fees received for the registration of motor-cars $19,000.

The policy adopted by this province may be briefly stated to be, first, to build the larger bridges of permanent material, and as the population is largely around or near the shore it follows that the bridges are near the mouths of the rivers, and generally of considerable length and comparatively expensive.

Up to the end of the calendar year 1915, the sum of $3,400,000, in round numbers, had been spent upon the construction of 1,238 larger bridges, of which 760 are of steel and iron, resting on masonry or concrete substructures. The next step undertaken and now in progress was to construct the culverts and smaller bridges of permanent material upon the roads subject to the greatest travel, and to this end instrumental surveys were made and the structures located to the best advantage in respect to satisfactory side drainage. In connection with these structures, generally built by contract, some of the side ditching was included. The good material of the side drainage is placed on the roadbed, shaped to proper form and surfaced where most required with gravel or broken stone. The expenditure for this class of work to the end of the calendar year was $503,000, and upwards of 2,000 miles had been provided with this class of structures. The next step will be the perfecting of the drainage—both as regards side ditching and the form of the roadbed—surfacing, and the abolition of narrow tires. No macadam roads are in contemplation. At present it is believed to be more economical to make good dirt roads, keep them in good repair, and eventually as travel increases and financial conditions warrant, to proceed with more perfect surfacing.

There is the equivalent of 46 in. of rainfall during the year, mostly in the early spring and late autumn. The frequent thaws and freshets during the winter months cause the destruction of the roadbed and structures, and owing to climatic conditions existing in the province the maintenance of roads is a matter requiring a large expenditure per mile, and constant care and attention.

QUEBEC ROAD IMPROVEMENT.

During the few years that the laws of 1911 and 1912 have been in operation the roads of the whole province of Quebec have been transformed.

Out of 45,000 miles of provincial roads, 20,000 miles are regularly and systematically maintained under the supervision of the Roads Department.

Since 1908, 557·15 miles of roads have been gravelled in the province. During the same lapse of time 1,205·65 miles have been macadamised.

Since 1908, about 12,000 culverts (under 8 ft. arch) in concrete, iron, steel, or stone, have taken the place of the same number of wooden bridges.

Since 1912, the road Edward VII., between Montreal and the boundary near Rouse's Point, about 39 miles, was built by the Government. In 1913, the construction of the Montreal-Quebec road, on the north shore of the St. Lawrence, about 150 miles in length, was begun by the Government. This road, which will altogether change the conditions of traffic in the district which it traverses, will be finished this summer. The Levis-Jackman road, about 93 miles in length, will also be completed this summer by the Government. In 1915, the Sherbrooke-Derby road, 33 miles long, was completed. The Edward VII. and Montreal-Quebec roads are built in macadam; in a few months from now the first will be covered with a coat of asphalt; the Levis-Jackman and Sherbrooke-Derby roads are in gravel with the exception of 6½ miles on the Sherbrooke-Derby, which are in tarira macadam. In addition to the four provincial roads above mentioned, a plan for the construction of a road connecting Three Rivers and Grand Mère is actually under consideration.

Since 1912, about 500 municipalities have asked to share in the advantages offered by the Government to macadamise or gravel their roads under the law of 1912.

The Roads Department owns 57 macadam apparatus, which are loaned to the municipalities according to the circumstances. The department also owns a number of other machines, such as rollers, tractors, road machines, cranes, scrapers, which are, at the present time, being used in the construction of the Levis-Jackman road.

In addition to the machines owned by the Government, the municipalities own 143 complete sets of implements.

Each year the Provincial Parliament passes a vote "Improvement of Rural Roads," out of which subventions are granted for the maintenance, the macadamising, or gravelling of roads. This vote is generally $250,000. Before the law of 1912 was passed, it has been as large as $350,000.

Since 1911, the Provincial Government has paid for the maintenance and improvement of earth roads and for the construction of macadam or gravel roads, the purchase of machinery and administration expenditure, a total of $14,584,681·12.

The road improvement system of the province of Quebec presents two characteristic features: 1. Full autonomy is left to the municipal councils, these being free to accept or refuse the advantages that are offered to them. The objection might be raised that roads might be improved in a certain number of districts only, but this objection has been eliminated by the construction of provincial roads.

2. It provides for the construction by the Government of large arteries between the new centres, the effect of which is to complete the improvements made by municipalities remote from each other, and to create, in addition to local roads, long-distance communication roads.

MANITOBA.

THE GOOD ROADS BOARD.

The Act is administered under the Department of Public Works, through a Good Roads Board, consisting of three members and of which the Highway Commissioner is chairman. The duties of the board are to carry out the provisions of the Act, investigate and determine upon the most suitable methods of road construction and maintenance best adapted to the various sections of the province, and to assist and co-operate with municipal representatives in formulating adequate systems of roads in their respective municipalities.

APPLICATION FOR ASSISTANCE BY MUNICIPALITY.

Applications from the municipal councils for assistance under the Act are directed to the Good Roads Board. The proposal of the council is investigated by the board, assisted by its engineers, and its recommendation thereon made through the Minister of Public Works to the Lieutenant-Governor in Council for approval, which approval, if obtained, is given by Order in Council, and the municipal council thereby authorised to proceed with the work.

METHOD OF FINANCING ROAD IMPROVEMENTS.

A municipal council building a road or system of roads under the Act may procure the funds for so doing by any of the three following methods, viz.:—

1. By the issue and sale of debentures. Such debentures being for a term not exceeding thirty (30) years shall bear interest at a rate not exceeding six (6) per cent. The total amount of debentures which a municipality may issue under the Act must not exceed six (6) per cent. of the total assessed valuation of all real property in the municipality subject and liable to taxation and as shown on the revised assessment roll of the municipality. A municipal debenture by-law requires the approval of a majority of the ratepayers of the municipality, or portion thereof affected, who have voted upon such by-law.
2. By a special annual rate not exceeding five (5) mills on the dollar, which may be levied against the whole or any portion of a municipality benefited.
3. By apportioning a proportionate share of available municipal funds for the use and benefit of any portion of the municipality, which in the opinion of the council is specially benefited by the work.

PERFORMANCE OF WORKS.

All works to be performed under the Act are let by contract by the municipal council, subject to the approval of the Good Roads Board, unless it is mutually determined by the council and the board that it can otherwise be performed to better advantage. The works must be carried out in accordance with plans and specifications of the board and at all times under the general supervision of an engineer of the board.

GOVERNMENT FINANCIAL ASSISTANCE.

When any works have been undertaken by a municipality under the Act, the council, during the progress and upon the completion of such works, shall transmit to the board a statement setting forth the expenditures to date in carrying out the same, together with a statutory declaration of the treasurer of the municipality that such statement is correct, and upon such statement being verified by an engineer of the board, and certified by him that the works have been performed according to plans and specifications, and the contracts in that behalf, the Minister may, upon receiving said statement duly certified to by the board, direct the payment to the municipality of the following proportions, respectively, of said expenditure:—

1. In case of works, other than earth roads but inclusive of bridges and culverts (if such are of a permanent character) a sum equal to one-half ($\frac{1}{2}$) of the amount of all expenditures shown as aforesaid.

2. In case of earth roads, a sum equal to one-third (⅓) of the cost thereof, including bridges and culverts, and if such bridges and culverts be of a permanent character, the amount of aid may be increased to one-half (½) the cost of said bridges and culverts.
3. In case of roads forming part of a system of provincial highways, two-thirds (⅔) of the cost of construction thereof.

MAINTENANCE OF WORKS.

The cost of maintaining the works performed under the provisions of this Act in a state of good repair is borne by the municipality exclusively, and paid for out of the general funds raised annually for the ordinary purposes of the municipality, and not out of the moneys raised by debentures under the Act for the purpose of construction. If a municipal council fail to keep in good repair any roads constructed under the Act, the municipal commissioner may cause such maintenance work to be performed, and may collect the expense thereof from such municipality by levies made from time to time in accordance with the Municipal Commissioner's Act.

SASKATCHEWAN.

The highway construction work in this province, outside of cities, towns, and villages, which look after necessary work on their own streets, is carried on under two organisations—first, by the Provincial Government; and second, by the councils of rural municipalities. The work carried on by the Provincial Government consists of the construction of timber bridges, steel bridges on concrete foundations, the operation of ferries, and road construction and maintenance. The Government limits its highway work to trunk roads and main market roads. This highway construction work is carried on by the Government and under the control of the chairman of the Board of Highway Commissioners, the entire cost being met by the Government. The bridge work is generally done by contract. Expenditures are made from capital account on all work of a permanent nature, and from income account for work of a temporary nature, such as maintenance and repairs.

The following amounts were voted by the Provincial Legislature for road work for the year ending 30th April, 1915, and for the year ending 30th April, 1916:—

	1915.	1916.
For steel bridges on concrete foundations ..	$300,000	$100,000
Construction and improvement of public highways	1,200,000	200,000
	$1,500,000	$300,000

The amount voted by the Legislature, chargeable to income:—

Roads and bridges	$500,000	$216,000
Ferry accommodation	90,000	90,000
	$590,000	$306,000

The amounts voted for the year 1915 were about on the same scale as those voted in the years 1912, 1913, and 1914. In 1915, however, owing to conditions incidental to the European war, we did not spend more than about one-third of the amount voted, and for the current year, 1916, the vote has been cut down very considerably.

The rural municipalities work in co-operation with the Provincial Government on the construction of main market roads, but also find it necessary to spend a large amount of their funds on minor roads and for maintenance and repairs. The rural municipalities secure their funds from current taxes, and considerable has also been raised to be expended on permanent improvements, from the sale of debentures. There are about 300 rural municipalities now organised, and a municipality generally is 18 miles square, containing nine townships. The tax rate in the municipalities is not to exceed 10 mills on the dollar, administration, is devoted to highway improvement. The rural munici- and practically all of this money, except a small amount required for palities expended on public works in the year ending 30th April, 1914, about $1,975,000.

During the year 1913 and for three or four years previous to this date, we had a system of assistance or grants to rural municipalities for highway work. This system of grants, however, was discontinued in 1914. The main object in giving these grants was to give the Highway Commission the opportunity of exercising some authority over expenditures in rural municipalities and to get in touch with them so as to be able to advise them. This purpose has to a certain extent been accomplished, as shown by the marked improvement in the work of the rural municipalities, but it was found that there was a tendency in some municipalities, in order to take full advantage of the Government grants, to embark on an expenditure beyond what they could finance, with the result that some of them were led into financial difficulties. For this reason and for the reason that it was found very difficult to administer satisfactorily, principally because of the difficulty in having the municipal officials make proper returns, the system of grants was discontinued.

An Act respecting public highways was passed at the recent session of the Legislature. This Act became operative on 1st May, 1916.''

From these examples of the energy with which our Canadian cousins labour to lighten the difficulties of transportation of farm produce, it will be seen that there are ways and means of doing so in a country subject to long winters, ice, snow, and troublesome thaws. How much more easily could good roads be made in Queensland, where the only disability is an occasional flood. Readers of the ''Queensland Agricultural Journal'' may remember a series of excellent articles on ''Good Roads,'' by the Hon. A. J. Thynne.

NO COTTON, NO SHELLS.

BY G. STEPHEN HART, F.G.S., Hon. Sec. Munitions League, Mount Morgan.

As the season for planting cotton is again drawing near, it would be well for every Australian to more fully grasp the startling fact that our hold upon Australia will never be secure until we make cotton an important crop. We are within the reach of armed robbers, and we have no guns. Our country cannot be defended without munitions of war, and cotton is absolutely essential for their manufacture. Although high explosives may be made from coal tar products, or from grass tree gum, they cannot be fired from present day weapons without a large charge made from gun-cotton. And gun-cotton is merely cotton suitably treated with nitric acid which we could produce if necessary, and with sulphuric acid which we already manufacture.

Our citizen army and our Australian navy are worse than useless without a plentiful supply of gun-cotton, which at present we are obliged to import. But so long as we have to import it we are using up money urgently needed for other objects—money which we cannot afford to lose. And yet defend our selves we must. We now know something of the fate of a conquered nation. The deliberate systematic murder of every male Australian would be no greater a massacre than that of the Armenians. Our women might even be denied death. Without cotton such happenings are not within our control. Without American cotton they might not to-day be within the control of the Allies, and America does not always see eye to eye with them. There are cotton fields in Egypt and India, and in Asia Minor, but are they large enough? And will the oceans round Australia always be a protection and never a menace?

Since last September, when we pointed out the submarine menace, this demon of the deep has become more devilish. We have been permitted to read a few details of what submarine warfare means. We have been told each month that a large and more deadly type of submarine has just appeared. We have been startled to hear that a German submarine has safely crossed the Atlantic, and have had our fears allayed by an official British announcement that it is nothing for a submarine to cross the Atlantic, as more than a dozen British submarines had crossed before the first German! And we all feel certain that to-day's submarines will be surpassed again next month, and that those of next year will be nothing to the ones of the year following. And, to make a further difficulty to our importation of cotton, the building of trans-Atlantic airships has probably been already commenced.

In any case, why trust implicitly to America's cotton always coming to Australia's shores when needed? Americans may not always love Australia. We may annoy them with our views on cattle or on copper, on paper or on the Panama Canal. And, just when we ask for Indian cotton, India may want it too, even if there are no super-submarines between us.

Before a wide-awake nation goes to war, she sees to all these little details. Germany invaded Belgium and got coal and zinc, she overran the north of France and got iron; she rushed to Galicia and past Warsaw and got petrol; Servia gives her copper; and the Turkish offensive in Asia Minor is towards the cotton fields of Egypt and of India. America was invaded by diplomatists with much the same idea. And Verdun? It has the less worked end of the rich iron field which stretches up towards Metz. A plentiful supply of iron is worth paying a big price for in war time. Might not our next enemy pay something to see that we got no cotton imports? Eight years ago an effort to get cotton grown in Queensland was brought to nought by German influences. That, in itself, should make us try again.

Even if Australian fields are not deluged in blood, may not other parts of the Empire need our cotton to stem the crimson tide? This war is not yet nearly over, and the pendulum of fate may not always swing on our side. A leading French actress said the other day, when she retired from the dramatic stage, "Now that three parts of our men have been taken from us, never to return, the day for such as I am is past." Three parts of our men! We hope the figure is not correct, but all the same it makes us gasp. We are determined to win this war, but this war is not the last. Nor is any long peace assured after it, for many hold that when a man is down is the time to kick him.

Australia has four times the area suitable for growing cotton that America has, and last year America exported to England over 10,000,000 lb. more cotton than the year previous. Probably all this went to make munitions, although in normal times only the waste short cotton is used for that purpose. It was because of our unpreparedness that the money for all this cotton left the Empire. Does it not seem full time that each of us spent a few days to get first-hand information about cotton-growing in Australia?

Some of us tried last year and failed. Three hundred were given seed to plant 800 acres, and 60 wrote to tell us how they fared. About two-thirds of them did not get sufficient rain to grow the plants at all; a number could not even sow the seed, the drought was so severe. It needs about an inch of rain about the time of planting to get the plants established. Once established the cotton bush laughs at drought. Continuous rain at picking-time may make the cotton cling to the hard seed case and makes picking difficult, but the gin will separate the cases with the seeds and will also tease out the matted cotton. Still continuous rain does certainly not improve the ripened cotton.*

We advocate planting with the first good rain after the frosts are over. If planted after Christmas, the crop may be still immature when the next winter's frosts arrive, but these late crops will get an early start after the frosts, whether any rain falls or not, and will have ripe cotton on them at the next Christmas-time. The crop does not ripen all at once, and in some cases may be picked for ten months out of the twelve. One successful grower advocates planting in February and not looking for a crop that season.

Here are some of last year's yields. It must be clearly understood that many of them were only small patches. The bolls were counted on twenty plants and averaged. The yield per acre is what would have been produced if that area of similar plants had been grown. It assumes as good attention to the larger area as to the small actual area.

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* Two or three days' rain will not seriously injure cotton.—[ED. "Q.A.J."]

Locality.	Rainfall while Plants Grew.	Average Bolls per Plant.	Yield per Acre Calculated.
			Lb.
Ballandean	18 inches	32	1,600
Chinchilla	4 inches	12	600
Corona	Drought	60	3,000
Ipswich	20 inches	12	600
Jandowaie	Drought	50	2,500
Gympie	Drought	30	1,500
Mount Perry	Drought	53	2,000
Mackay	Good rain	46	2,300
Rannes	5 inches	70	3,500
Tiaro	18 inches	85	4,250
Wowan	Drought	9	450

The best plant reported bore 111 bolls. One acre of such plants as this would yield some £40.

Fourteen different growers noticed that if the root went straight down the plant would grow erect, as required for convenient and speedy picking; whilst branching surface roots gave low spreading branches, difficult to handle. This proves that deep cultivation is essential, except in open scrub soils in which the roots can easily get well down.

How much a man can pick in a day depends largely on how the plant is grown and upon the method adopted by the picker. The majority of last year's pickers have never seen an experienced picker at work, and had low branching bushes. Few claimed to have picked over 60 lb. in a day, and one put his daily tally as low as 10 lb. One novice, however, picked 150 to 170 lb. per day, and is confident he could easily pick over 200 lb. with a little more practice. Of course, his plants grew erect and his crop was good.

In connection with the question of picking, the Queensland Branch of the Commonwealth Institute of Science and Industry is already investigating the claims of various picking machines. These machines could travel from one grower's field to another's, and solve this difficulty of picking in Australia. At the same time, it must be remembered that in America, even where highly-paid white labour is employed, it pays to pick by hand. In previous years 350 and even 400 lb. has been picked in a single day from suitable crops, and it would be well if one of the few expert pickers at present in Queensland were engaged to visit growers at the next picking season, and show them how it should be done.

In order that cotton may be available for munitions it seems that it must be grown as a commercial crop. For this it has the attractions of a fixed price and a certain market. There are no middlemen to haggle with, and the farmer is not compelled to sell for a small fraction of the retailer's price. If the plants once get well established a crop seems certain, although, as with all other crops, there may be caterpillars and grasshoppers to contend with. Our other "safe" crops are usually painted in more rosy tints than they deserve. Maize, for example, is shown by the Agricultural Department's year books to average the Queensland grower only £3 per acre gross. Deduct from this the cost of attention from seed time to harvest, and the price of bags and cartage and railway freights, and it will be seen why we so often hear of the "poor struggling farmer." It is usually unpayable to grow either maize or pumpkins, as they are usually grown in Queensland, so it behoves every farmer to find out from his own individual experience whether it would not pay him better to grow cotton. This from a purely personal standpoint; from a national standpoint it seems essential that every man, woman, and child in Queensland should become acquainted with the cotton bush and, if possible, produce a large quantity of cotton. The possible alternative is too hideous even to contemplate.

Most of the Mount Morgan members of the Munition Cotton League are not directly interested in farming pursuits: but it means much to each one of them that Australia should remain the country of the Australians, and we make our appeal solely from grounds of national urgency. No member of our League is seeking monetary gain from our efforts to get cotton grown in Queensland.

Last year our efforts failed. Climatic conditions and a lack of volunteer helpers were the chief causes; but better Britishers than we were driven back at Mons on account of unfavourable conditions and a lack of volunteers. Now it is a different story with them, for they have got their better conditions, and volunteers are numerous. May we, with confidence, depend upon a full quota of agricultural volunteers when our weather conditions improve sufficiently? We, too, are striving for the Empire's safety. We want the interest of every man and boy, and every girl and woman. There is no age limit; there is no medical examination; there is no question of leaving dependents unprovided for. Will you help us to settle once for all whether your part of Australia will grow cotton? Try from 1 to 5 acres, or a small patch; just a couple of bushes, according to the area of land at your disposal; and when your trial has been completed, tell us what you have found out. In the multitude of experimenters we shall find wisdom. At present the Queensland Government guarantees you 1¾d. per lb. for cotton as picked from the bushes, seed and all. You have merely to bag it up and consign it, freight paid, to Brisbane. The Agricultural Department will provide you with the best obtainable specially imported seed, delivered free at your nearest railway station. Later, when the crop succeeds, it might easily become possible to guarantee every grower a fixed minimum per acre of cotton planted, if he gave it the correct attention. How would a minimum income fixed at planting time suit our farmers? It would be more pleasing than a fixed maximum sale price for their produce, and would win more wealth to the State. And, apart from its commercial attractiveness, do not forget that the safety of Australia is bound up in cotton.

Remember, no cotton means no shells, and grow your own little munitions factory in some corner of your land.

And may Australian cotton-growing prove to be a source of prosperity and happiness to many in times of peace; and, in times of war, a means of sure defence.

MARKET GARDENING.

SIMULTANEOUS CROPS.

In the July issue of this Journal we mentioned that, in South Africa, a farmer raises two crops on the same land—one of potatoes, the other of maize—and both yield excellent returns. The simultaneous crop system is especially adapted to vegetable growing in the market garden, as our own experience has shown. Why raise crops on 3 acres which can be profitably raised on 1? All that is needed is, in the first place, to gain a knowledge of such crops as may be put in at the same season of the year, and of the length of time during which they occupy the ground. For instance, there are three vegetables—cabbage, lettuce, and radishes. Of these, radishes will mature in three or four weeks, lettuce in five weeks, and cabbages about twelve weeks, and we may add beetroot, which may be taken up in about six weeks. Taking the three first named. The radishes will mature first. When they are removed the lettuces will follow in due course, when the cabbages will have full possession.

This simultaneous cropping has its advantages and also its disadvantages. These are shown by Professor Watts in his valuable work on "Vegetable Gardening" as follows:—

Advantages.—(1) Economy of space, no ground being wasted; (2) economy of plant food, the surplus applied for one crop being utilised by another; (3) economy in tillage, the same ploughing, harrowing, and cultivation serving for two or more crops; (4) concentration of operations, the force of labourers being confined to 1 acre instead of to 2 or 3; (5) soil improvement, as when peas or beans are planted with other crops; (6) increased profits from the area planted.

Disadvantages.—(1) The necessity for an increased amount of hand labour in weeding and the use of hoes and hand-wheel hoes; (2) a greater demand or requirement for plant food and soil moisture; (3) the close attention and time required in looking after details. For these reasons, many commercial gardeners prefer to cultivate more acres, with perhaps less annoyance. Some plans of double cropping, however, are no more troublesome than that of single cropping.

Simultaneous or companion cropping is most advantageous under the following conditions:—(1) When the area of ground available is very much limited; (2) when land values, rentals, and taxation are high; (3) when liberal supplies of manure are easily obtainable; (4) when the necessary labour can be secured without much difficulty; (5) when good markets are easily accessible; (6) when irrigation is possible, or when the soil moisture can be readily conserved.

In making specific plans for companion cropping, the following factors should be carefully considered:—(1) The time when each crop will be planted; (2) the time when each crop will mature; (3) the required space for each vegetable at various stages of growth; (4) the habit of growth of the various plants; (5) the supply of soil moisture and plant food in their relation to time of maturity and the space required.

GROWING CABBAGES FOR SEED.

Most of the seed used by market gardeners is purchased from seedsmen who draw their supplies from well-known great seed houses, either home or foreign, and those gardeners who supply the city shops, hotels, and private houses say that it would not pay them to grow their own seeds, because, they argue, seeds may be purchased from commercial houses at less cost than they can be grown on the farm. The fact is that few market gardeners possess the necessary knowledge which would enable them to grow good seed. But this is a branch of the business which they should study if they wish to avoid the disappointments often resulting from purchasing seeds from any but well-known firms. It does not pay to take chances, and skilful breeding often produces better seeds than those which can be procured on the market, notwithstanding the fact that we have a Pure Seeds Act in operation in Queensland.

Take cabbages as a proof of what can be done in raising seed from any particular variety. Two things have to be attended to in the process. One is known as "roguing," the other as "burying." The first is one of the most important operations in growing high-class seeds. "A rogue," says Mr. R. L. Watts, Professor of Horticulture in the Pennsylvania State College, U.S.A., in his work on "Vegetable Gardening," "is a plant that is off type, and should not be allowed to produce seed." The discarding of such plants is called "roguing," and the ultimate crop depends mainly upon the thoroughness of this operation. Roguing is generally practised by seed raisers, but in too many cases it is not sufficiently severe. The right soil and climate cannot do everything. Scientifically conducted, breeding plots and rigid roguing are the two greatest needs of a seed farm.

A common practice in America among large growers is to sow so late in the season that only a small percentage of the heads will be well developed when the roguing is done. The plants should not be grown in excessively rich soils, as very large heads do not winter well.

When the plants are well developed, the "burying" process commences, and thorough protection must be given to both roots and heads. They may be buried where they were grown, and the covering removed in the following spring. In this way a crop of seed may be produced without two transplantings; but the more approved plan is to lift the plants and bury them before there is danger of very cold weather. Various methods are used in providing winter protection. One of the best is to place three plants side by side in long trenches made by ploughing a furrow each way. The plants may be placed erect with the roots down, but better protection will be given by placing them at an angle of 45 degrees. Two or 3 in. of soil is sufficient covering at first, although no injury will be done by 6 in. of soil if the weather is cool. When severe cold weather comes on, several inches of manure should be added.

As soon as the spring arrives the plants are removed from the trenches, and set in rows 3½ ft. apart. Rather deep furrows are required to give the plants proper support, and ridging or staking must be resorted to later in the season when the seed stalks are developing. To allow the seed shoots to push through the heads with ease, the tops are cut crosswise at the time of planting. When these have appeared, and the pods have turned yellow, the seed stalks are cut off and placed in rows to dry. From two to four days are generally required for drying. It usually takes 20 to 25 plants to make 1 lb. of seed, although frequently 2 oz. are obtained from a plant.

For preserving cabbages for a future market, various methods of burying or partial burying are in use in America. Where the winters are mild, little protection is necessary. The plants are pulled and stood upright in long shallow trenches 5 or 6 ft. wide, a furrow is thrown up on both sides, and hay is spread over the heads, the amount of hay being increased as the weather gets colder. With this plan, the heads become solid, and may be removed at any time during the winter. In Maryland, a favourite plan is to turn the heads where they grow to the north, and to cover the stems and the lower part of the heads with earth. On Long Island a very common method is to draw a furrow 6 to 8 in. deep, pull and place the plants heads downwards in the trench. A furrow thrown from each side completes the work of burying. This makes a covering of about 1 ft. of soil.

Another plan of burying cabbages for keeping purposes is used in all parts of the Northern United States. The crop is cut with sharp hatchets, stubs 4 or 5 in. long being left for convenience of handling. The heads are placed on top of the ground in long rows, three heads in width, side by side, the rows running up and down the slope of the land to provide drainage. The usual custom is to invert the heads. A layer of cabbages, one or two heads in width, may be placed on top. After the crop has been placed in this manner, a two-horse plough is used in drawing two furrows on each side of the windrows, as much soil as possible being thrown over the cabbage. The burying is finished with shovels, when care is taken to get 6 in. of soil over the cabbage. The soil will afford sufficient protection at least for a month, when 3 or 4 in. of manure should be thrown over the ridges. If the cabbage is sound when buried there should be no loss from this method.

Such are the methods of raising cabbage seed and preserving cabbage for a future market, as described by Professor R. L. Watts.

We are not aware whether any Queensland farmer has tried a plan for keeping cabbages for a rise in the market price. It would be interesting to know whether it would succeed in this State, if only as an experiment.

COTTAGE GARDENING AT GLADSTONE.

The accompanying photographs show what can be done by an energetic, healthy man, even when advanced in years, in the way of fruit and vegetable growing on a small area of land. Mr. Brotherton, of Gladstone, who has, as he says, passed the allotted span, became the owner, some two years ago, of what he describes as the most miserably poor bit of land in Queenland, with a gravelly soil, overlying stone and stiff clay, near a brickyard. He fenced it in and dug a well 12 ft. deep, only to find salt water. So he abandoned it and constructed a dam, which gives a supply of water all the year round. All this with his own hands. Mr. Brotherton arrived in Queensland in 1866 by the ship "Flying Cloud," and started farming at Doughboy Creek, afterwards taking up a selection at Bundaberg, and subsequently on the Kolan River, and was the first settler in the Mount Larcom Scrub, where he was seriously wounded in the head by the fall of a limb from a tree whilst clearing his land. He recovered from this, received the old-age pension, and has made a comfortable home for himself on his present location. Amongst the crops he raises are New Guinea butter beans, guada beans, tomatoes, onions, carrots, turnips, beetroot, lettuce, radish, English and sweet potatoes, a variety of herbs, such as sage, mint, thyme, marjoram, and lavender; and amongst fruits, granadillas, passion fruit, figs, persimmons, custard apples, grapes, oranges, lemons, and strawberries. Nor does he neglect flowers, of which he grows many kinds, as well as ferns and palms. All this he attends to single-handed, and his success should go far to show what are the possibilities awaiting those amongst our returned soldiers who wish to take up farming or gardening.

COTTON SEED FOR DISTRIBUTION.

Intending cotton-growers are notified that the Department of Agriculture and Stock now has cotton-seed for distribution, and applications should be sent to the Under Secretary, stating the area which it is proposed to plant. Full instructions as to the planting and after cultivation and harvesting of the crop may be obtained from the Department. Attention is drawn to the notification as to the disposal of the crop, on page VII. of the "Queensland Agricultural Journal."

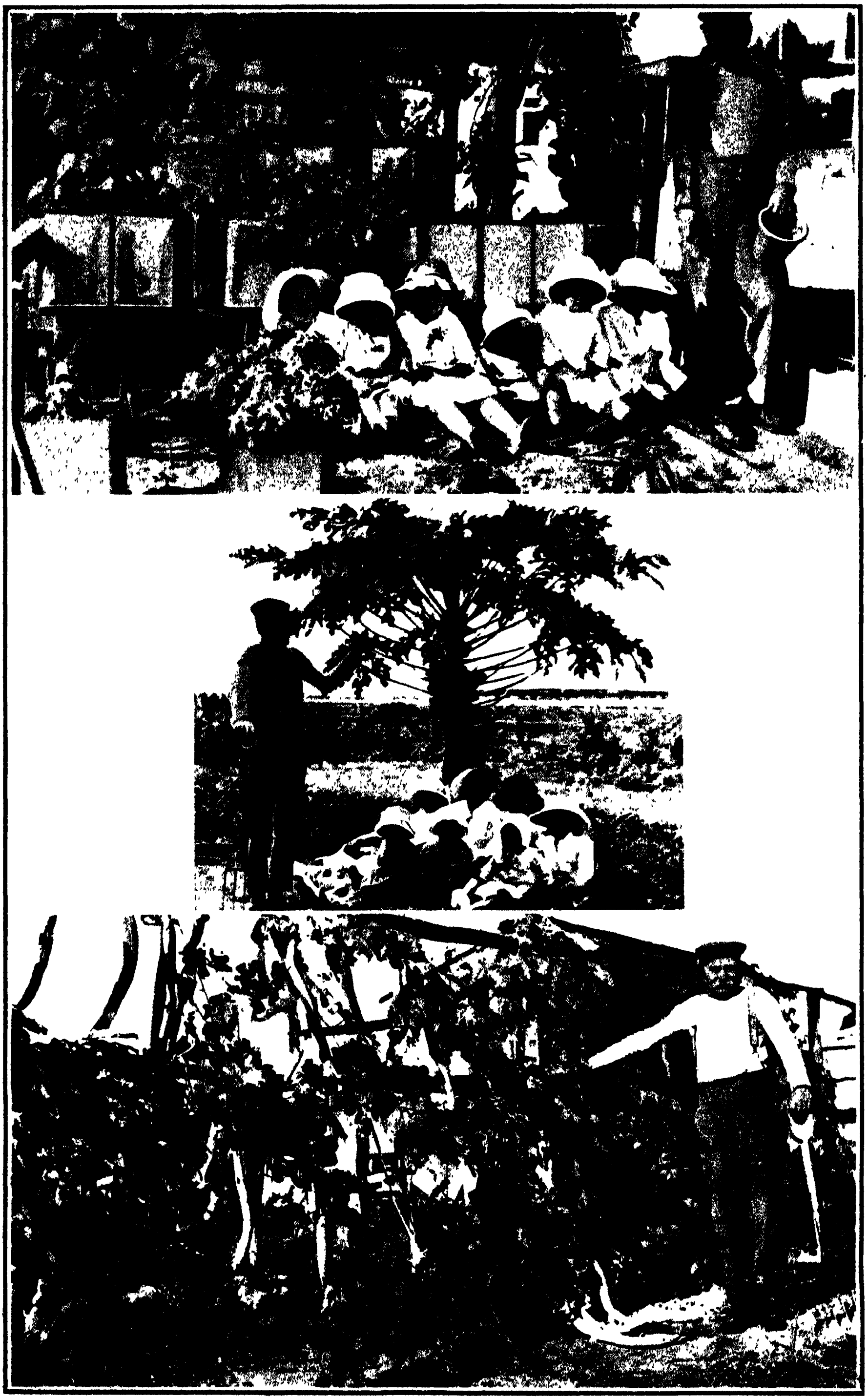


PLATE 11.—COTTAGE GARDENING AT GLADSTONE.
1. Bush-house and the Rising Generation of Gladstone.
2. Twelve-months-old Papaw Tree on Mr. Brotherton's Selection. 3. Guada Beans.

Plate 12.—Arrival of His Excellency the Governor-General at the Show Ground.

(Inset)—The Official Opening by His Excellency the Governor-General, 16th August, 1916.

EXHIBITION NOTES, 1916.

THE EXHIBITS OF THE AGRICULTURAL DEPARTMENT AT THE EXHIBITION OF THE QUEENSLAND NATIONAL ASSOCIATION, AUGUST, 1916.

The exhibit made by the Department of Agriculture and Stock this year, and briefly described in this issue, presents a number of new and interesting features.

In a general sense there is an entirely new caste in the arrangement and design of the Court, which in the latter respect may be attributed to the up-to-date ideas brought to this State from the Panama Exhibition.

The individual sections of the Court are so arranged as to serve to illustrate at least a part of the work of the Department and bring it before the public.

Whilst it is not altogether practicable to adequately represent the activities of the whole of the Agriculture and Stock Department and its staff, the numerous exhibits, as shown, have a very vital and intimate connection with production, and for this reason they have been made as educational in character as possible.

The Government Botanist and his staff have catered for the pastoral and agricultural section of the community by contributing a unique collection of "weeds and plants reputed poisonous to stock," weeds common to cultivated lands, native and introduced grasses, and a variety of specimen plants of economic value. The Agricultural Instruction and Field Staff, who are brought into immediate touch with agricultural production, have staged a comprehensive range of products, principally cereals, and have specialised in the direction of crop improvement and in methods to increase yields. Wheat, maize, and the grain-yielding non-saccharine sorghums are very fully dealt with.

The competition cobs entered in the Juvenile Corngrowing Competition are displayed in the Maize Section of the Court, and advantage has been taken of this fact to prepare a number of instructional exhibits and examples bearing on seed selection and improvement.

A very instructive exhibit of the "Pure Seeds Act" has been prepared, which illustrates in a graphic manner how weed seeds and foreign seeds are introduced in commercial seed samples, and the advantages to be derived from sowing only sound germinable seed, free from impurities.

The exhibit of economic entomology and plant diseases prepared by the Government Entomologist and Vegetable Pathologist deals with the life-history of a number of typical destructive insects and pests common to special crops, fruits, plants, seeds, and grain; also with remedies calculated to keep them in check and destroy them.

A number of large realistically coloured nature-prints of certain plant diseases are represented as unique, original work in portraying a highly technical subject.

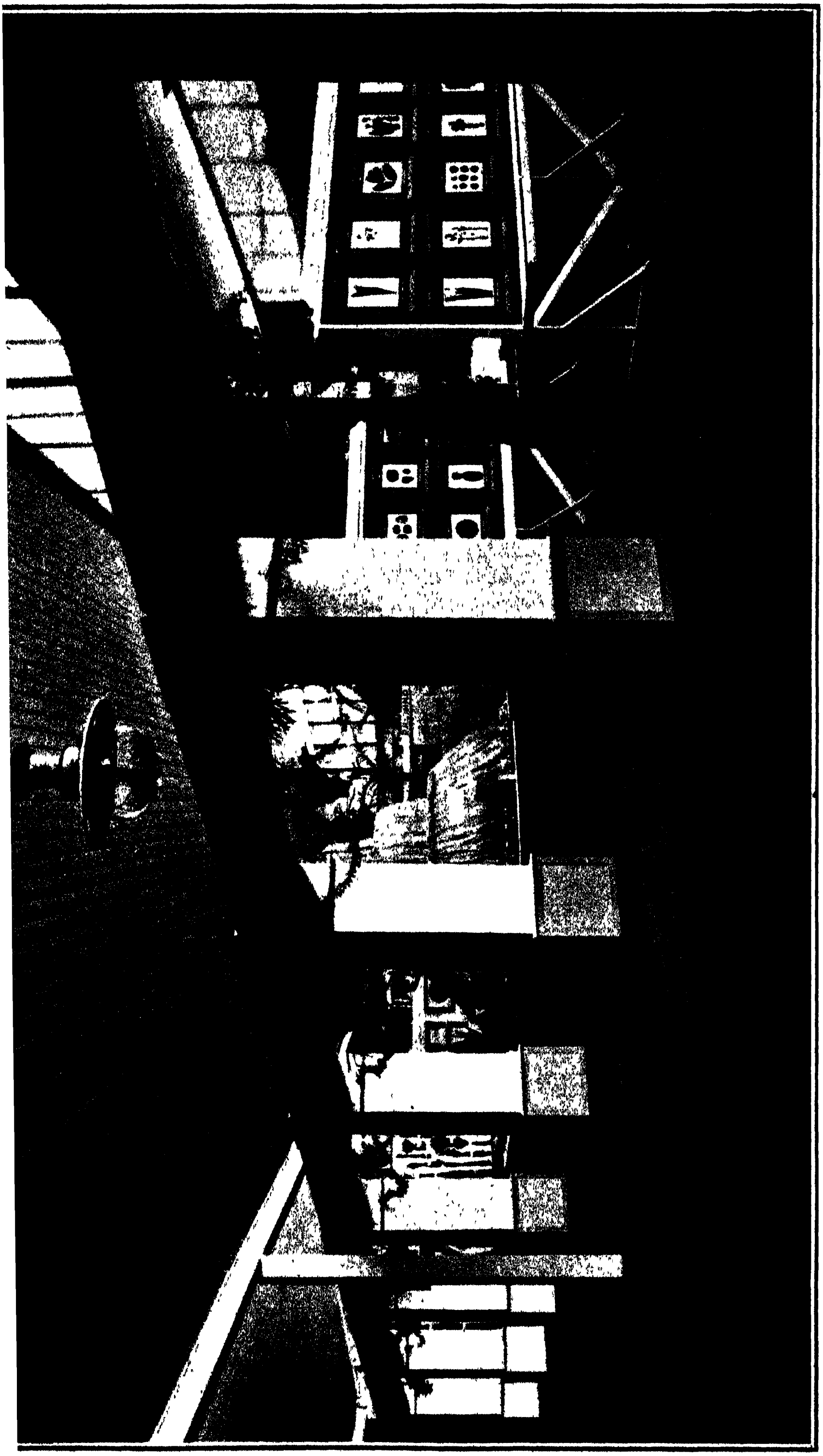


PLATE 13.—ENTRANCE TO THE COURT OF THE AGRICULTURAL DEPARTMENT'S DISPLAY.

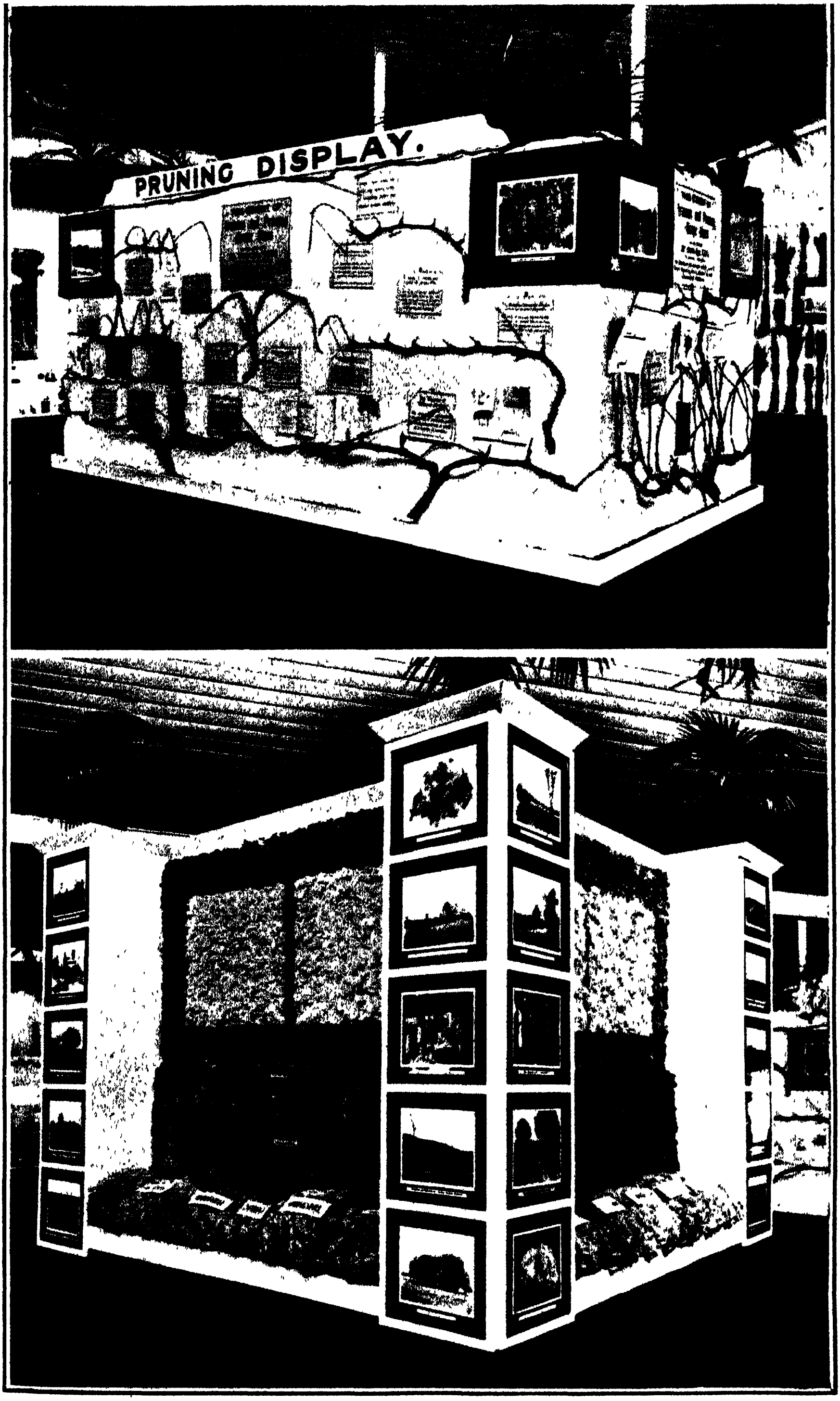


PLATE 14.—(A) AN OBJECT LESSON ON TRAINING AND PRUNING GRAPE VINES.
(B) TROPHY OF REPRESENTATIVE QUEENSLAND GROWN WOOLS AND SAMPLES OF STUD WOOLS.

The Sheep and Wool Expert has prepared an artistically-arranged display of Queensland-grown wools, the classification of which clearly demonstrates the potentialities of the State for the production of the highest quality staple. In this exhibit will be found a collection of fleeces and wool samples identical with those sent to the recent Panama Exhibition, where they secured the gold medal, the hall-mark of quality.

The Fruit Cultural Branch has staged a comprehensive pruning display, where several systems of training and pruning grape-vines are graphically shown. This exhibit should prove a source of never failing interest to vignerons, who can readily compare the different methods of pruning to suit certain kinds of grape-vines in order that maximum cropping results may be secured.

The Yeerongpilly Stock Experiment Station is represented by a most interesting display of laboratory products prepared at the Station for use by stockowners to effectively combat the diseases common to live stock in Queensland. Pure cultures of lactic acid bacilli, as supplied and used by the various cheese and butter factories, are also shown.

The part played by this institution in dealing with ticks and tick fever, tuberculosis, pleuro-pneumonia, &c., is generally recognised, and an endeavour has been made, in arranging the exhibit as a whole, to illustrate the various phases of work undertaken in the interests of the State.

In the Fibre Section there is a special trophy allotted to sisal fibre, and ropes and twines manufactured therefrom.

The Queensland Agricultural College is represented this year in the Court by a comprehensive display of saddlery and blacksmithing work, all of which has been carried out by the students. In the Stock Sections some excellent specimens of draught and dairy stock are entered in the various competitions.

SUGAR-CANE.

This section was to be represented by a collection of approved varieties of cane from the Mackay Sugar Experiment Station, but it was not possible to forward them in time. Mention should, however, be made of the fact that the Bureau of Sugar Experiment Stations is playing an important part in the distribution of new and proved cane varieties.

The practice in vogue is to carefully select, examine, and pack the cane plants so as to reach their destination in good order. These are all distributed free of charge to *bonâ fide* cane farmers. It is estimated that in this way upwards of 1,000 tons of cane plants have been sent out during the past ten years. Before the canes are allowed to leave the Stations they undergo chemical and commercial trials through plant, first, and second ratoon crops, each variety being tested at least four times during a season, so that records may be obtained giving farmers and millowners information as to their sugar contents at different times during the crushing period, and whether such canes may be regarded as early or late. They are also rigorously watched for evidence of disease, and no affected canes are allowed to go into general distribution.

NOTES ON EXHIBITS OF GRASSES AND WEEDS.

In the Agricultural Department's Court will be found an instructive exhibit of the weeds which have spread in this State from time to time, and the clause in the Pure Seeds Act which aims at the prevention of this sort of trouble must appeal strongly to all cultivators of the soil after a glance at the number shown, which is by no means exhaustive. It is a noteworthy fact that nearly all of these usurpers of the soil have their origin in foreign lands. Many of the worst have been brought in with a view of their usefulness without the introducers having a thought of their future career. For instance, the pastoralists who over fifty years ago grew the new hedge plant, *Opuntia inermis,* catalogued for this purpose by nurserymen in the South, little thought of the vast area of good land which would ultimately be covered by this troublesome pest known as the prickly-pear, neither did those desirous of enhancing the beauty of their flower borders by a plant of *Lantana camara* dream that it would overrun some of our finest scrub lands and grow with a luxuriance greater even than in its native land. Many of our worst weeds are of annual growth, and for their eradication the gardener's adage, "A year's seeding gives seven years' weeding," should be borne in mind. Some of these are Sidas, Medic Burr, and Thorn Apple; while in the case of perennials, such as Milky Cotton-bush, Docks, &c., the whole plant must be removed. To give an idea of the growth of some of the most troublesome weeds whole plants have been mounted. Such well-known usurpers as Stinking Rodger, Noogoora Burr, Thistle, Bathurst Burr, and Ink Weed are too familiar to need else but a passing notice, but attention might be drawn to an undesirable alien which has made its appearance during the last year or two and likely to become as great a pest as any. This is the prostrate-growing Khaki Weed, which, having found its way to South Africa from South America, was kindly passed on to Australia, which seems to have earned the reputation of being the dumping ground of numerous vegetable pests. The specimens shown are labelled in clear type with the systematic and (where known) vernacular names, and also information as to their character. For instance, we are informed that the Bitter Cress (*Senebiera didyma*) and the Hexham Scent (*Melilotus parviflora*) are known to impart a disagreeable flavour to butter when cows have browsed on them.

On the opposite side of the Court will be seen an exhibit comprising a century and a-quarter of our native grasses, in the possession of which Queensland is known the world over. Notice is drawn to the valuable Mitchell Grasses which have made our inland pastures so famous. Not only are they rich in nutritive properties but their tenacity of life enables them to withstand the severest droughts. The Downs country has earned distinction also for the presence of the well-known Blue Grass which is considered by stockowners as second to none for grazing purposes. Attention is drawn to a number of coarse-growing kinds, such as Scented Golden Beard, Kangaroo Grass, Oat Grass, Swamp Foxtail, and Blady Grass, which are valuable when in early growth, and we are told that the latter, under the name of Lalang, furnishes material for paper-making—a commodity at present occupying the thoughts of the commercial world. *Chloris barbat* will be seen to resemble the much-esteemed

PLATE 15.—PORTION OF COURT SHOWING PART OF THE EXHIBIT OF NATIVE GRASSES, WEEDS, AND PURE SEEDS, AND OF THE YEERONGPILLY EXPERIMENT STATION.

PLATE 16.—CORN-GROWING COMPETITION, AND EDUCATIONAL MAIZE EXHIBIT.

Rhodes Grass (*C. Gayana*) of South Africa. and is probably quite as nutritious as that species. It will be observed that several kinds which are looked upon in some quarters as weeds are included—Summer Grass and Crow's-foot, for instance; but in other parts of the world they are looked upon as useful fodders, and are commonly cultivated for that purpose. Panicum is the vernacular name generally applied to a grain by the seed merchants, but it will be seen to belong to a genus embracing many valuable species indigenous in this State. It is evidently not only the large-growing kinds that are valuable, the prolific Button Grass being equally relished by stock on the inland plains. A useful grass for cattle is shown in the Bunch Spear Grass, but it is very troublesome to sheep on account of the seeds, the awns of which penetrate into the flesh of the animals.

As in the case of the weeds an informative label is attached to each specimen.

MAIZE.

This exhibit has been prepared and arranged strictly as an educational factor and to illustrate the seed maize improvement work which the Department has in hand.

Something over four million bushels of the cereal are produced annually in normal seasons.

The choice of a variety to suit different soils and localities throughout the State is to be regarded as an all-important one, and a good deal of attention is being paid by the Department to methods of seed selection calculated to effect an improvement in crop production and in type of grain.

The essential features of seed maize selection are graphically illustrated in various ways.

The value of "ear to row" tests, as a basic system for effecting improvement in crop yields, is clearly demonstrated by the differences in yield, amounting to slightly over 30 bushels per acre, which have been experienced in field trials carried out during the past season.

Certain botanical characteristics of maize applicable to the subject under consideration have also been illustrated. This section should prove of unflagging interest to farmers and others who are associated with primary industries.

SISAL FIBRE.

Up to the present very little attention has been given to the production of sisal fibre in Queensland. The crop is generally regarded as one suitable to countries where cheap labour is obtainable. Owing to the shortage of binder twine in the United States last year the price of the fibre reached £60 per ton—more than double the usual price on the market. If Queensland is to be a self-supporting country there is every reason to expect that the growing of sisal fibre will be taken up in the near future, possibly not as a main crop but as a subsidiary one. The plant is extremely hardy, and is suitable for arid limestone soils and waste places where the raising of other crops would be impracticable. The exhibit of assorted ropes manufactured in Brisbane from Queensland-grown sisal fibre is also to be on view.

PLATE 17.—SISAL HEMP TROPHY, WITH ROPE AND TWINE, MANUFACTURED IN BRISBANE.

GRAIN SORGHUM.

A few varieties of the "grain" or non-saccharine sorghums have been grown in Queensland during recent years, but only in a haphazard way, simply because few persons have really any adequate comprehension of their worth compared with other grain crops. In countries where climatic conditions are similar to Queensland they have been tried and proven.

Two years ago the Department of Agriculture obtained seven high-yielding varieties, which were afterwards grown in both the Central and Southern portions of the State. The results obtained were highly satisfactory; so much so, that demonstration plots were established last season in ten districts, the objective being to find out varieties best adapted to give high yields, to test their value as a dry-district crop, and to improve the respective types by selection.

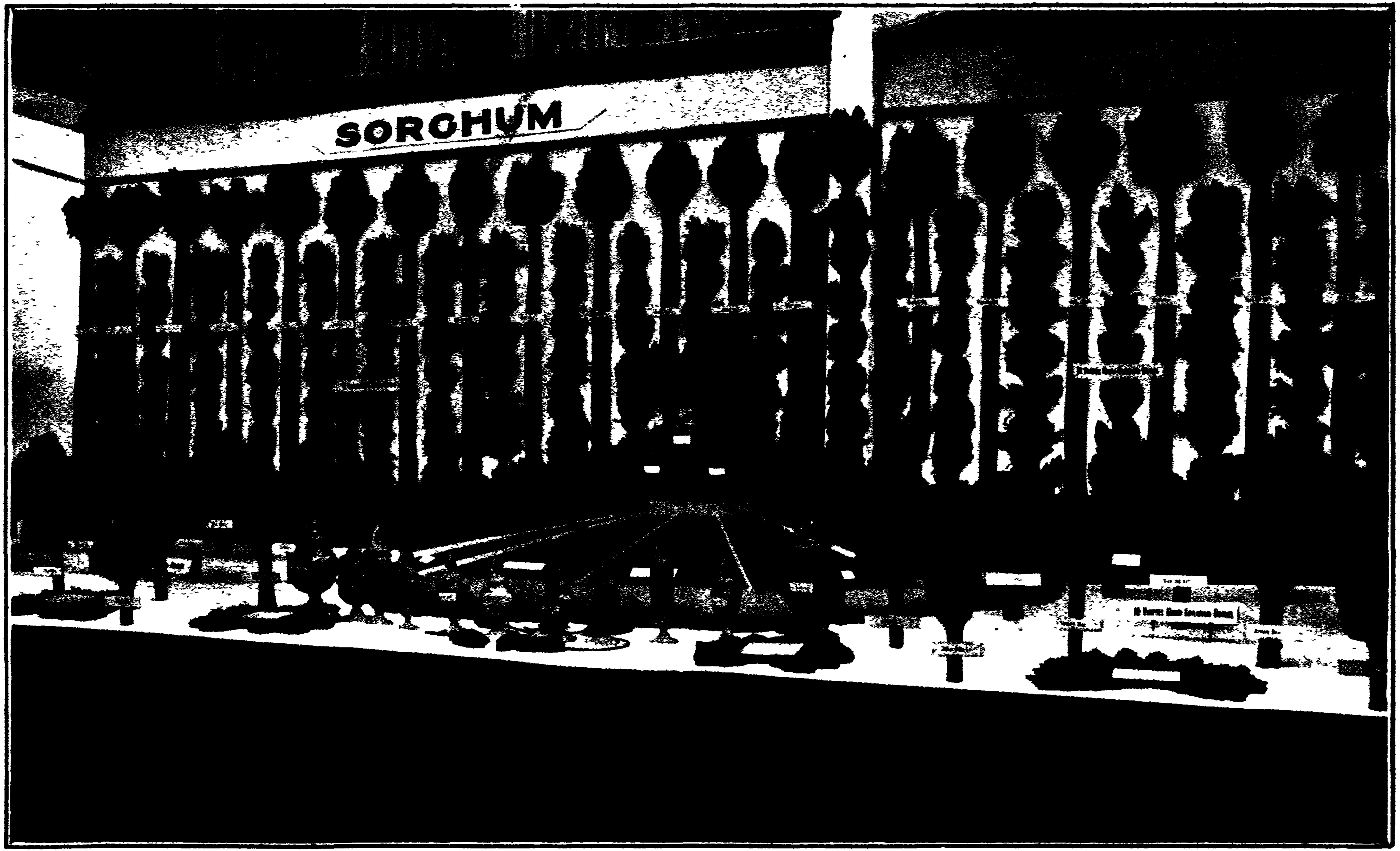
The results of the season's operations are displayed in detail. Groups from widely different districts are shown side by side for comparison; the variations in yields of green fodder and grain from the respective sorts are shown in graph form. Some very heavy yields of grain were recorded. In the Boonah district, when climatic conditions were favourable to growth, Cream Milo gave a return of 103 bushels per acre, whilst several varieties reached the 90 bushels mark. This season, in several localities where the maize crop was practically a failure, a number of these grain-producing non-saccharine sorghums yielded up to 50 bushels per acre, thus bearing out their reputation as dry weather resistant crops.

The heavy yields obtained may in a measure be attributed to careful selection of high-yielding types and their propagation in "ear to row" tests. Typical heads are selected, each being planted in a separate row. From the best row the following season's stud plot is planted. The results from last season's "ear to row" test are on view, together with graphs showing variation in yield, &c.; also a selection of heads from each of the ten varieties picked out for next season's operations.

The feeding value of the grain from a 100-bushel crop is of the greatest importance. Analyses made by the Agricultural Chemist show that the Milos, or dry-district sorghum, are equal to maize in this respect, being a most suitable grain not only for human beings but for poultry, pigs, and other farm animals. Samples of flour, bran, and pollard, and porridge meals made from Cream Milo and Feterita (*Soudan Dhoura*) are shown. The meal makes a very wholesome porridge, and several persons who have sampled it report that although the colour leaves something to be desired the flavour is delicious.

Several varieties of the well-known saccharine types of sorghum are also shown. These are grown for the purpose of improving the quality and yield of green fodder.

Excellent samples of broom millet are exhibited, which have been grown in different parts of the State; some of these have been raised from seed imported by the Department.


SORGHUM

WHEAT.

The principal feature in this section is the display of grain samples representative of the seed wheat distributed to farmers this year by the Department of Agriculture and Stock under the wheat distribution scheme.

Last year was a disastrous one for this State's wheat crop owing to the drought. All the available locally-grown seed was purchased, and a quantity secured from South Australia and a small amount from New South Wales, the whole being put through cleaning and dressing machinery before despatch to recipients; 98,228 bushels of seed were purchased, and 89,558 bushels sent out to 1,435 applicants.

If assistance had not been extended in this way it is certain that much of Queensland's wheat areas would have had to remain unsown.

Full descriptions of the characteristics of the several varieties of wheat have been given in concrete form, together with information as to their milling qualities.

Another section of this exhibit is devoted to a display of wheat, principally in sheaf form emanating from the Roma State Farm, as an illustration of a number of very promising varieties raised at that institution. Wheat-breeding and wheat improvement have been carried on at this farm for a number of years, and there are now several promising varieties which can be regarded as an improvement on those in general cultivation.

JUVENILE CORNGROWING COMPETITION.

The cobs entered in the competition will be exhibited in the Maize Section of the Departmental Court.

	Bushels per Acre.
Special Prize—	
Value £10, A. Gon Chee, Lake View, Killarney ..	133·6
Value £5, E. E. E. Burton, Booie, *viâ* Kingaroy ..	121·8
Value £3, H. Gon Chee, Lake View, Killarney ..	114·0
No. 1 *District*—	
Prize, value £5, W. E. Patterson, Glamorgan Vale, *viâ* Walloon	82·3
Prize, value £2, G. Osborne, Mount Alford, Boonah	69·5
Prize, value £1, F. A. Bade, Ebenezer, *viâ* Rosewood	61·5
No. 2 *District*—	
Prize, value £5, J. S. Bray, Lawnton, N.C. Line ..	75·5
Prize, value £2, S. Adcock, Eel Creek, Gympie ..	68·5
Prize, value £1, A. F. G. Pedwell, Samford, *viâ* Enoggera	66·4
No. 3 *District*—	
Prize, value £5, J. M. Maguire, Ropeley, Gatton ..	56·0
Prize, value £2, N. A. Smoothy, Pinelands, Crow's Nest	43·9

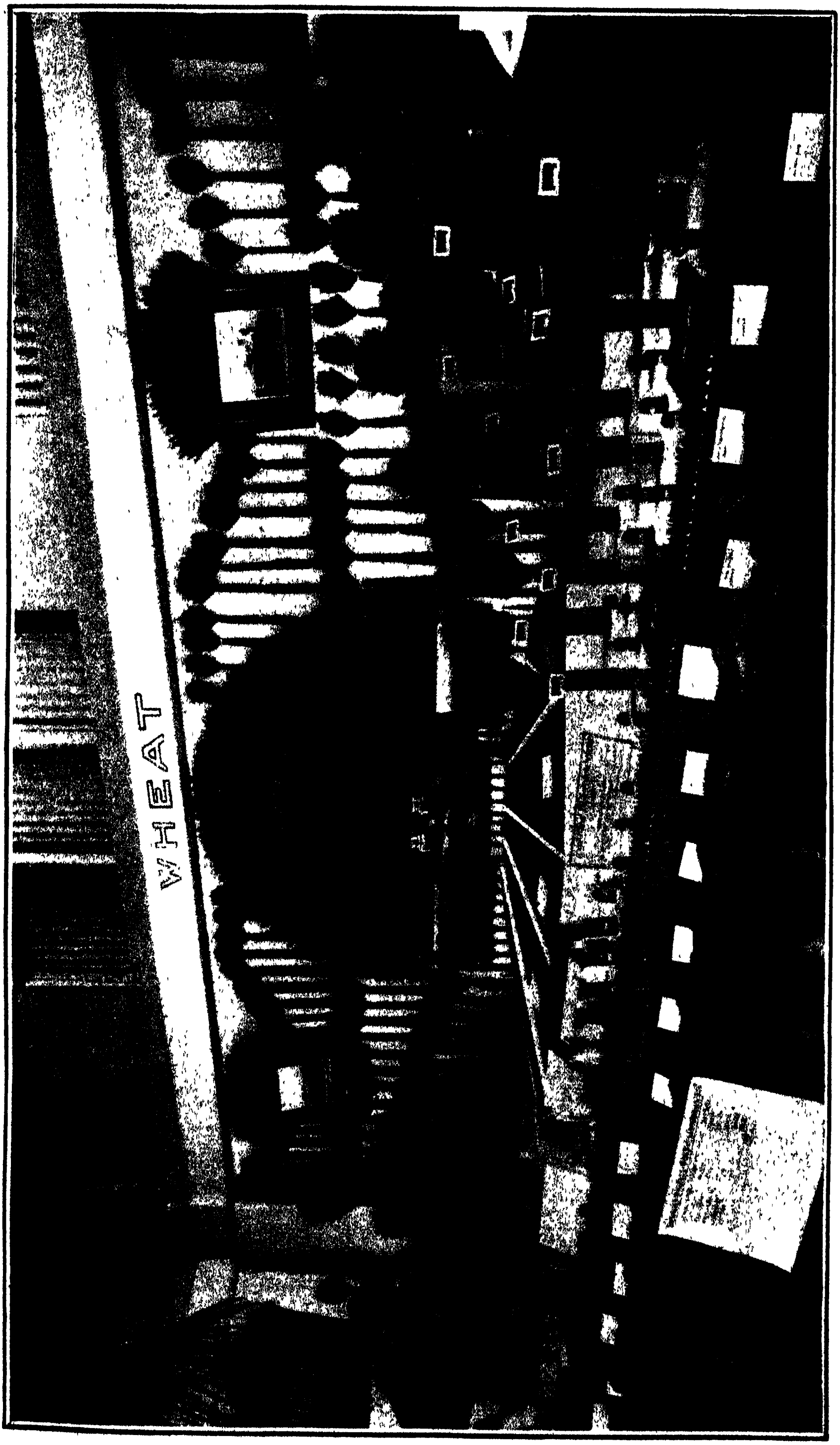


PLATE 19.—DISPLAY OF WHEATS SUITABLE TO QUEENSLAND, AND NEW CROSS-BRED WHEATS RAISED AT THE ROMA STATE FARM, BUNGEWORGORAI.

	Bushels per Acre.
No. 4 *District*—	
Prize, value £5, E. E. E. Burton, Booie, *viâ* Kingaroy	121·8
Prize, value 2, J. R. C. Hart, Ovingham, Blackbutt	54·8
Prize, value £1, E. V. E. Burton, Booie, *viâ* Kingaroy	40·7
No. 5 *District*—	
Prize, value £5, A. Gon Chee, Lake View, Killarney	133·6
Prize, value £2, H. Gon Chee, Lake View, Killarney	114·0
Prize, value £1, H. Gow, Fair View, Killarney ..	84·4
No. 7 *District*—	
Prize, value 5, J. S. Bullock, Pelican, Chinchilla ..	32·1
Prize, value £2, N. C. Bullock, Pelican, Chinchilla..	27·0
Prize, value £1, R. J. Bullock, Pelican, Chinchilla ..	22·3
No. 8 *District*—	
Prize, value £5, R. S. Laver, Riversleigh, Gogango..	33·4
Prize, value £2, R. V. Williams, Hawk's Nest, The Caves	31·9
Prize, value £1, F. Williams, Hawk's Nest, The Caves	30·7
No. 9 *District*—	
Prize, value £3, A. R. Vance, Barrine, Kulara, N.Q.	101·7
Prize, value £2, G. Gellweiler, Barrine, Kulara, N.Q.	84·4
Prize, value £1, J. D. Gellweiler, Barrine, Kulara, N.Q.	83·7

Two prizes only have been awarded for District No. 3. No prizes have been awarded for No. 6 District, as the yields were below 20 bushels per acre. In District No. 9 there were only five competitors. Rule 9 of the competition has been waived by the Minister for Agriculture, and three prizes allotted instead of one: the prize money in this instance being altered to £3, £2, and £1, for first, second, and third place, respectively.

The exhibit of agricultural seeds and seeds of weeds frequently found in commercial samples draws attention to the Department's work under the Pure Seeds Acts, so that farmers and others interested may be able to easily identify the impurities found in many samples. A collection of weeds and weed-seeds has been made and exhibited.

Under the Pure Seeds Acts samples may be sent to the Department for test, as to purity and germination, the fee being 2s. 6d. per sample; by which means the actual value of a sample may be determined before sowing.

It is, however, possible for the farmer to make a practical test of many seeds himself, and the simple method shown in the exhibit is one that could easily be adopted by buyers and sellers of seeds. Those interested would do well to interview the officer in charge of the exhibit, who will give information as to seed-testing, the identification of weed-seeds, and particulars as to the requirements under the Pure Seeds Acts and Regulations.

EXHIBIT OF ECONOMIC ENTOMOLOGY AND PLANT DISEASES.

The Division of the Government Entomologist and Vegetable Pathologist—Mr. Henry Tryon—is represented by two series of the objects used by him for educational purposes.

1. A series of nineteen showcases illustrating the life-history of typical destructive insects or the pests of special plants. These have been primarily designed for the preparation of wall diagrams, of which several are already in use in the form of large coloured photographs, with letterpress covering the subject of remedies, &c., constituting an attractive display at the different country shows served by the Department of Agriculture's travelling exhibit. They reflect the skilful and artistic work, under the above officer's direction, of Mr. E. Jarvis, Assistant Entomologist, and Mr. H. Jarvis, Technical Assistant.

The following subjects are illustrated:—

1. Potato—Ladybird—*Epilachna 28-punctata.*
2. Potato—Flea Beetle—*Haltica solani.*
3. Potato—Moth Worm—*Gelechia solanella.*
4. Sweet Potato Weevil—*Cylas formicarius.*
5. Sweet Potato—Web worm.
6. Bean Fly—*Agromyza phaseli.*
7. Pumpkin Beetle—*Aulacophora olivieri.*
8. Codling Moth—*Carpocapsa pomonella.*
9. The Bean and Pea Weevils—*Bruchus spp.*
10. The Maize Moth—*Dichocrocis punctiferalis.*
11. The Cabbage Cut-worm—*Agrotis*, and Army Worm—*Leucania unipuncta.*
12. Tryon's Fruit Fly—*Batracocera Tryoni.*
13. Injurious Insects of the Citrus Plants.
14. Branch-cutting Borer of Orange—*Uracanthus.*
15. Scale Insects (Coccidæ) of Citrus Plants.
16. The Grain Weevil—*Calandra oryzæ.*
17. Wheat and Maize Moth—*Sitrotroga cereallela.*
    The Mediterranean Flour Moth—*Ephestia Kuehniella.*
18. Potato-Green Caterpillar—*Plusia argentifera.*
19. Cattle-destroying Saw Fly—*Pterygophora.*

2. Illustrations of certain plant diseases. This section of the exhibit marks a new departure in educative display. It comprises two stands, each holding a score of large nature-prints, realistically coloured under Mr. Tryon's direction by Mr. H. Jarvis. This, the first series of a larger collection in preparation, contains ten illustrations of citrus diseases, five of banana, two of coffee, three of pineapple, three of grape-, one each of tomato and lucerne-, five of nematode rootgall-, and seven of potato-maladies.

It is proposed that this collection of pictures, whilst meanwhile forming part of the equipment of an economic museum, may serve also, at some future date, as the basis for the preparation of wall-diagrams, they being severally reproduced in all their faithfulness to nature by the three-colour process to this end.

TRAINING AND PRUNING GRAPE-VINES.

This trophy is quite an educational study, and includes a large number of examples of methods of pruning recommended by Mr. C. Ross, Instructor in Fruit Culture, as adapted for vine culture in this State.

Printed descriptive cards are in close proximity to each subject, and coloured pointers directing attention to explanatory details.

The group includes prepared cuttings, rooted yearling cuttings, trained vines of various ages, and unpruned vines with white ties attached showing where cuts should be made when pruning.

A collection of pruning instruments is also exhibited.

EXHIBIT FROM THE STOCK EXPERIMENT STATION, YEERONGPILLY.

TICKS AND TICK FEVER.

This section is illustrative of—

1. The Cattle Tick and its life-history.
2. Specimen showing the characteristic *post-mortem* appearances in the various internal organs.
3. Microscopic preparation of stained tick fever blood; coloured sketches made direct from the microscope showing blood from cases of tick fever with the organisms in the red blood cells.
4. Appliances used in connection with protective inoculation, and methods of preserving the blood.
5. Maps, charts, diagrams illustrative of the American method of tick eradication.
6. Maps showing the progress of the Cattle Tick in Australia since its first introduction at Port Darwin in 1872, and into the Gulf country of Queensland in 1894, and the whole of the tick-infested country at the present time.

TUBERCULOSIS.

Museum specimens showing manifestation of the disease in cattle, pigs, goats, sheep, horses, fowls, and some wild animals.

Drawing from the microscope showing tubercle bacilli in milk, lung of a bullock, udder of a cow, lymphatic gland of a pig, liver of a sheep, and liver of a fowl.

PLEURO-PNEUMONIA.

Lung of an ox showing characteristic marbled appearance; also enlarged bronchial glands.

Specimens of pleuro virus.

Methods of preservation.

MUSEUM SPECIMENS.

This collection is interesting. Pathological preparations illustrative of the various manifestations of disease in stock, including tuberculosis, actinomycosis, blackleg, malignant œdema, contagious mammitis, Johnne's disease, swine fever, chicken cholera, fowl enteritis and diphtheria, carcinoma, papilloma, epithelioma, sarcoma, osteoma, adenoma, fibroma, dermoids, odontomes, &c.

Internal and external parasites, including flukes, hydatids, tapeworm, round worm, and worm nodules in beef.

Larvæ and pupæ of the English warble fly, bots, acari, lice, and various species of ticks.

Also a collection of hair balls removed from the stomach of apparently healthy cattle, horses, sheep, pigs, dogs, and cats.

LABORATORY PRODUCTS PREPARED AT YEERONGPILLY EXPERIMENT STATION.

Blackleg vaccin.

Pleuro-pneumonia virus.

Blood serum for tick fever.

Anto-vaccin for contagious mammitis and sepis.

Pure culture of lactic acid bacilli growing in milk are supplied to various cheese and butter factories throughout the State.

SPECIMENS ILLUSTRATING LABORATORY METHODS OF INVESTIGATION.

Plate and tube cultivations of micro-organisms illustrating the method of making a bacteriological qualitative and quantitive analysis of samples of water supplies for meatworks, butter and cheese factories, and varieties of fresh, preserved, and canned foods.

THE DISTRICT EXHIBITS.

"A" GRADE.

Additional interest attached to the competition in this class, owing to the fact that the Queensland Districts were challenged by the Western Districts of New South Wales. This is primarily due to energy and excellent organisation of Mr. and Mrs. G. Trevitt, who for several years had exhibits at Bowen Park Shows. The principal centres of population in this part of the State of New South Wales include Lithgow, Paramatta, Orange, Mudgee, Bathurst, Dubbo, and Penrith. Paramatta contributes examples of the woollen manufacturing industry, whilst Dubbo is represented by excellent samples of various kinds of citrus fruits, and Mudgee by dried fruits, vinegar, pickles, preserves, and other household incentives to appetite. From Penrith comes a collection of timbers, and coal, iron, and limestone are contributed by Lithgow. All these, as well as a great assortment of farm produce, are artistically displayed to the best advantage, and thus form a very pleasing and instructive exhibit.

SOUTH COAST, QUEENSLAND.

The South Coast District comprises a considerable area of the fine fruit-growing and grazing country from Wynnum to Redland Bay, Cleveland, Beenleigh to Beaudesert, and embraces generally the fertile lands of the Logan and Albert. It is noticeable that, amongst the beautifully arranged exhibits, wool is taking a larger place than it did last year. This is probably largely owing to the energetic and successful efforts of Mr. W. G. Brown, Instructor in Sheep and Wool, to establish flocks of certain cross breeds of sheep suitable for the coast lands of the South. Many farmers have already many sheep on their selections, and, from all accounts, they appear to be satisfied that sheep on the coast have come to stay, and to increase rapidly. Many other industries are well represented. Dairy produce is well to the fore, and both the Kingston (on the South Coast Line) and the Beaudesert factories contributed fine samples of butter, and a ponderous trophy of cheese was shown by Mr. J. Wilson, Merrimac. The fruitgrowing industry was naturally well represented by magnificent collections of citrus fruits, besides various other fruits for which the district is justly celebrated. Sugar-cane was well represented, and quantities of splendidly grown cane demonstrated the recuperative powers of the soil and the plants, which had successfully recovered from the disastrous effects of long-continued drought. Samples of the rum made at the Beenleigh distillery and sugar locally manufactured were also amongst the exhibits. The agricultural produce was mainly collected, we were informed, from the Beenleigh and Beaudesert sectors of the district. Bacon exhibited by Messrs. Baynes Bros. and the Queensland Co-operative Bacon Company, preserved fruits, jams, pickles, &c., made a splendid show in the food section. In addition to various articles of woodwork contributed by Messrs. Lahey Bros. and J. D. Campbell and Sons, a number of toys made in the Southern district were shown by Messrs. Lahey Bros. This is, in effect, a most important feature of their exhibits, forecasting, as it does, the establishment of a new and important industry, which previous to the war was productive of great revenue and profit to German manufacturers. "Made in Queensland" should, ere long, take the place of "Made in Germany."

"B" GRADE.

In this grade there were four competitors in the Queensland Districts Exhibits and three one-man farm entries: Kingaroy, Gympie, Crow's Nest, and Fassifern (Boonah-Fassifern).

KINGAROY.

The various exhibits in this section were most artistically arranged, and the produce, &c., showed to best advantage. Kingaroy, we may state, is 120 miles from Maryborough, on the Kilkivan and Nanango Branch Line. It is practically the centre of a very large agricultural and dairying district, producing cereals such as maize, wheat, oats, and barley to perfection. Although some sugar-cane was shown, it appeared to be more intended for decoration than as an exhibit, since canegrowing, except as fodder for stock, is not a suitable paying crop for the district. Grasses, both natural and artificial, were conspicuous, and forty-two varieties were to be seen. Potatoes and vegetables were well represented, and amongst them was to be noticed a gigantic cauliflower which turned the scale at over 50 lb. The exhibit of seeds was excellently arranged. Quantities were contained in snow-white bags, and an endless variety of all kinds of garden seeds were tastefully laid out in small saucers. That the district is well adapted for cotton-growing is evidenced by the samples

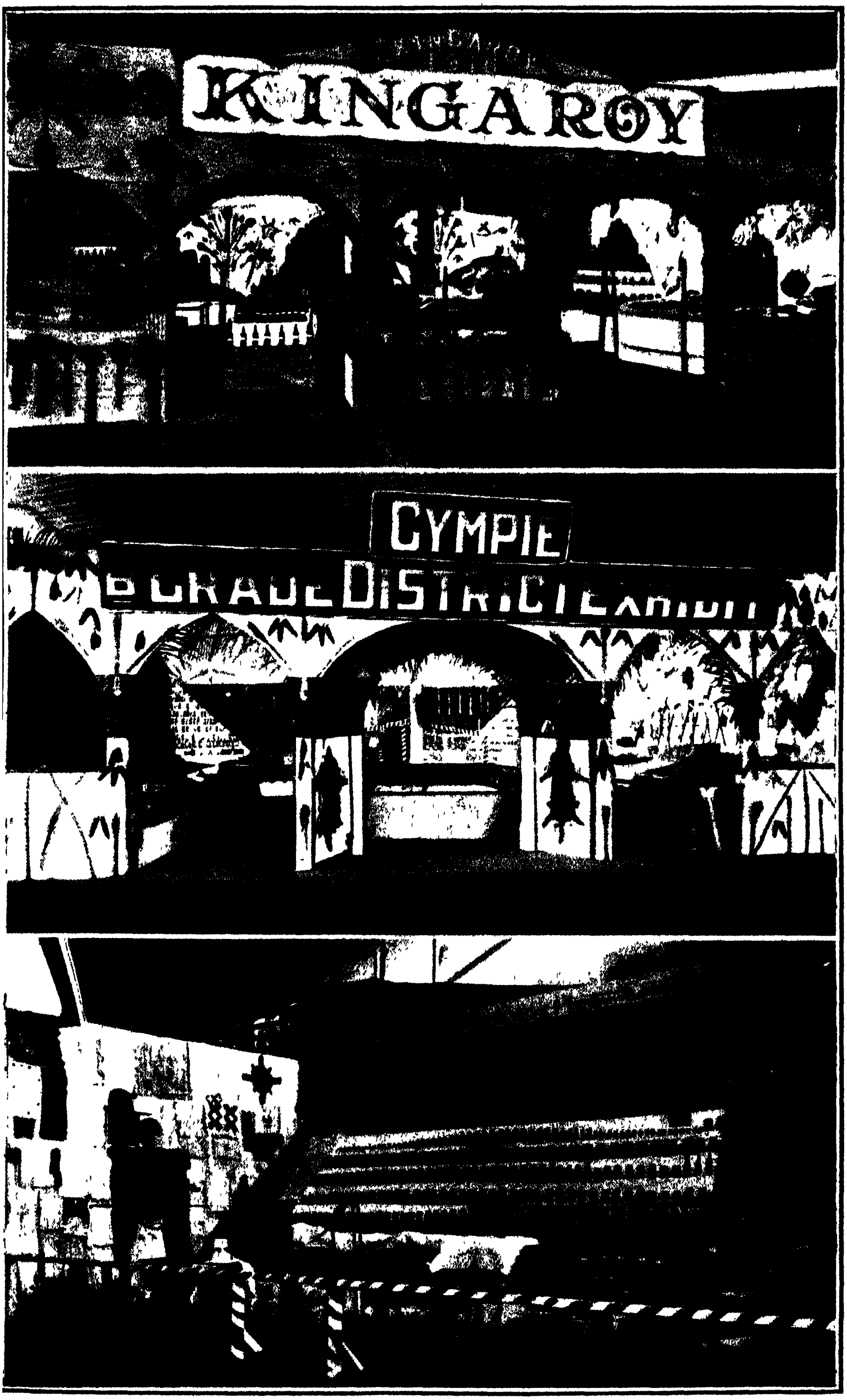


PLATE 20.—DISTRICT EXHIBITS: (*a*) KINGAROY DISTRICT EXHIBIT; (*b*) GYMPIE; (*c*) ONE-FARM EXHIBIT BY O C. WILLIAMS.

shown of cotton in the pod, in the seed, and ginned. Should cotton-growing again revive in Queensland, and reach the total area of 14,000 acres, as in the old days, Kingaroy should not be in the tail of the running. Various kinds of hay were arranged in neat, small bales, comprising oaten, wheaten, lucerne, panicum, &c. Some good specimens of fruit were shown, and woman's share in the industries was in strong evidence in the shape of jams, jellies, pickles, bottled fruits, cakes and lollies, and other confectionery, fancy work, and many useful comforts for soldiers in the shape of knitted articles. In the manufacturing line were several samples of well-made furniture, leather and leather goods, brushes, broom and basket ware, and the mining industry was represented by several minerals such as coal, copper, ironstone, limestone, granite, &c.

GYMPIE.

The long famous goldfield of Gympie has year by year gradually developed its agricultural industries, and to-day everywhere around the field are to be seen neat gardens, small farms, and market gardens, none of which were in existence during the palmy days of alluvial and reef mining. Many of the exhibits came from the now well-known agricultural sections of the district—Maroochy, Cooroy, Yandina, &c. Sugarcane was much in evidence, as many as forty different varieties being furnished by Mr. Evans, of Maroochy, whilst much came from Cooroy and Chatswood. Cooran was represented by a display of citrus fruits; Gympie by bananas, pineapples, and papaw apples. Timbers in various forms announce the wealth and value of the forests of the surrounding country. Dairying is carried on to a large extent, and the fine exhibits of several dairy factories, supplemented by those of farmers, comprised, butter, cheese, bacon, hams, and lard. Beekeeping appears to be successfully carried on at Gympie, as was evidenced by a good exhibit of honey. Potatoes, vegetables, and vegetable seeds appear to be a strong point with the market gardeners. Then, as in other district exhibits, there are strong evidences of the skill of the distaff side of the exhibitors, in the shape of jams, jellies, pickles, bottled and dried fruits, fancy work, and confectionery. Even the children vied with each other in exhibiting a number of very useful walking-sticks, obtained from the neighbouring scrubs. The Red Cross branches of Gympie and Lagoon Pocket showed a quantity of fancy work and useful articles.

The wool exhibit in this court was contributed by Mr. H. F. Walker, Traveston, and Mr. A. Francis, Kin Kin; forty varieties of sugar-cane by Mr. N. E. Evans, of Maroochy. Especial interest was taken by visitors in the fine collection of preserved fruits, jams, jellies, and women's work prepared by Mrs. Mathieson, of Skyring's Creek. The Montville district, as a fruitgrowing centre, was worthily represented by a special exhibit of a large variety of citrus fruits, which were a very fine feature of the court. This was contributed by the Montville Fruitgrowers and Farmers' Progress Association.

CROW'S NEST.

In the good old days, when the principal industry of this district was timber-getting, few people gave any thought to the possibilities of agriculture; yet, where the great pine trees were cleared out, there remained a rich soil only awaiting the "tickling with the hoe" to transform the land into what it is to-day, thanks to the pioneer farmers who tackled the strenuous work of clearing the scrub and eventually the harder job of getting rid of the stumps to facilitate the use of the plough. The Crow's Nest District Exhibit at the Exhibition of 1916 is a standing monument to the pluck and energy of those who added this to the many other fine agricultural areas in the State. The whole of the arrangement of the exhibit, which was engineered by the Crow's Nest Agricultural, Horticultural, and Industrial Association, was most effective, with the white background, scored well in points on judging day. There is a very excellent exhibit of hay and chaff, maize and wheat, and natural and artificial grasses, the Soudan grass shown being over 6 ft. in height. Some very fine pumpkins (table and cattle), sorghum, millet, sisal hemp, &c., indicate the possibilities of the district beyond the ordinary farm crops. The Crow's Nest Butter Factory exhibit was very fine, as were the samples of bacon, hams, and rolled and smoked beef and mutton.

Vegetables of several varieties and very fine potatoes were a feature in the section. Besides all the above there were various fruits, fresh as well as preserved, jams, jellies, &c., and a good sample of cotton grown at Virginia. Timber specimens numbered 110 of different kinds. The manufacturing industries were represented by bricks, draining and roofing tiles, &c. As usual the exhibitors' families supplied an excellent assortment of jams and other comestibles, needlework and knitting, and the school children's work was also included.

BOONAH-FASSIFERN.

The organisers of this exhibit (the Fassifern Agricultural and Pastoral Association) had a very wide field to exploit. This extended from Ipswich to the border of New South Wales, and included a portion of the Logan district, with, of course, Boonah, Harrisville, &c. It is thus to be seen that it was quite possible to concentrate a vast quantity of the products of different soils and to some extent of different products in the constitution of the exhibit. To begin with, the decoration of the pavilion and the arrangement of the exhibits was admirable, the latter being all displayed to the greatest advantage. Of hay (20 varieties), chaff (20 varieties), grasses (120 varieties), were all got up in artistic manner. The cereals were strongly in evidence, as were green fodders and pumpkins (one of which weighed 125 lb.). Many varieties of millets and sorghums were shown; also ensilage and other prepared fodders. Amongst the roots and their products were to be found arrowroot, sweet-potato starch, and home-made cornflour. Fruits and vegetables were abundant, as were also exhibits of butter from the Boonah Butter Factory, cheese from Harrisville, hams and bacon and their by-products also from Harrisville, honey and wax, sugar-cane, and a singular exhibit was coffee made from beans, barley, maize, rye, and burnt peas, and even from bran and treacle. Other exhibits of interest were timber (dressed and undressed), stone, bricks, soils, &c., greasy and scoured wool and mohair from the Angora goat, together with needlework and knitting, school work, wines, and aerated waters.

WALLUMBILLA.

Our illustration gives a very fair idea of the comprehensive collection of vegetables and other farm produce, which afford good evidence of the fertility of the district, which is reached by the Western line, 294 miles from Brisbane. The exhibit attracted much attention from the visitors to the Exhibition, who commented most favourably on the variety and excellence of this court.

PLATE 21.—NON-COMPETITIVE DISPLAY OF PRODUCTS FROM WALLUMBILLA, GROWN UNDER FIELD CONDITIONS WITHOUT IRRIGATION OR MANURE.

The products from this farm were grown under field conditions without the aid of irrigation or manure.

ONE-FARM EXHIBITS.

For the One-Farm Exhibits there were three entries: Mr. O. C. Williams, of Rosevale Farm, Plainby, Crow's Nest District, who has twice before competed in this section, and was the winner of the first prize last year; Mr. J. A. Nystrom, of Booie, Kingaroy, who appears for the second time, and Mr. W. Allan, of Gympie. Mr. Allan also had charge of the Gympie District exhibit. He showed in his own exhibit most of the products of the land 5 miles from the town, and his exhibits, which were tastefully arranged, comprised such cereals as wheat, maize, oats, barley, and rye, many grasses, sorghums, millets, hay, and chaff.

As for vegetables, it would be hard to judge between those which he staged and the best of their kind in any section. To these were added cotton, tobacco, and flax. In fruits his bananas, pineapples, papaws, &c., were admirable from our point of view. Honey, preserves, jams, jellies, pickles, chutneys, sauces, and fancy work, were due to the work of Mrs. Allan.

Mr. Nystrom, to judge by his display, thoroughly understands how to make the most of the capabilities of his land, by judicious intense cultivation. His pavilion was replete with many varieties of cereals—maize, wheat, rye, and barley—and many grasses, millets, and sorghums. Fodder for cattle and horses was a great feature of the exhibits, as nothing appeared to be wanting in this line. There were nearly a dozen different varieties of potatoes and three different kinds of sweet potatoes. Garden produce, cotton, and wool formed no less important exhibits of the industries which are increasingly engaging the attention of farmers, not only at Kingaroy but in most agricultural centres in the State. The preserves and many household comestibles indicate the skill and industry of the lady members of his family.

Mr. O. C. Williams, who, as above stated, succeeded in winning the first prize last year, has once more, with the aid of his industrious family succeeded in getting together an exhibit which enabled him to again come out a winner. We understand that this exhibit consisted of over a thousand articles produced on his farm. There were eighteen varieties of chaff, and fourteen of hay, besides forty-three varieties of native grasses. The rest of the collection is made up of potatoes, vegetables, fruit, foodstuffs, an assortment of fruit drinks, wines, and samples of women's and children's work. The exhibit attracted much attention from the visitors to the Exhibition.

Of the three farmers who competed in this section, the winner was Mr. O. C. Williams, who scored a win last year. In nearly each department in the competition he was ahead of the other competitors. His total score was 371 points, Mr. Allan coming second with 332, and Mr. Nystrom third with 328 out of a possible 600. The following are the details:—

—	Possible Points	Williams.	Allan.	Nystrom.
DAIRY PRODUCE—				
Butter	25	14	18	10
Cheese	20	10	..	16
Eggs	5	3	4	4
	50	27	22	30
FOODS—				
Hams	20	12	15	10
Corned beef, mutton	10	8	6	6
Honey	10	5	6	7
Beeswax	5	2	3	4
Bread	5	4	4	3
Confectionery	5	4	3	3
Lard, tallow	5	4	3	3
	60	39	40	36

—	Possible Points.	Williams.	Allan.	Nystrom.
FRUITS, VEGETABLES—				
Fresh fruits	25	14	20	14
Dried fruits	10	7	5	7
Preserved fruits	15	12	9	9
Fresh vegetables	15	12	8	10
Pickles	15	8	10	12
Potatoes	25	18	18	14
Pumpkins	10	8	6	6
Cocoanuts, nuts	3	2	2	2
Seeds	5	4	2	2
Arrowroot	5	4	3	3
Cassava	5	..	..	..
Ginger	5	..	2	3
Sugar beet	5	2	3	3
	143	95	90	82
GRAIN—				
Wheat	25	20	5	16
Maize	20	16	5	12
Barley	10	8	6	8
Oats, rice	15	8	12	8
	70	52	28	44
TROPICAL PRODUCTS—				
Sugar-cane	30	..	20	..
Cotton	10	3	9	6
Coffee	15	..	12	..
	55	3	41	6
Tobacco	10	7	6	8
HAY, CHAFF—				
Hay	20	15	12	15
Grasses	10	9	3	5
Chaff	20	15	10	15
Ensilage	15	10	2	10
Fodder	15	10	10	10
Sorghum	10	8	6	7
Hemp	5	4	1	..
Flax	5	4	2	..
Cowpea	7	5	2	5
Broom millet	10	6	9	6
	117	86	57	73
WOOL—				
Greasy	20	6	12	18
Mohair	5	3	4	2
	25	9	16	20
Drinks	10	6	4	1
WOMEN'S AND CHILDREN'S WORK—				
Needlework	10	9	8	6
Schoolwork	10	8	6	4
Fancy work	10	8	8	8
	30	25	22	18
Miscellaneous articles	5	4	2	4
Plants, flowers	5	2	3	..
Labour-saving articles	10	7	3	..
Effective arrangement	10	9	8	6
TOTALS	600	371	332	328

FRUIT EXHIBITS.

The competing districts were—Montville, Landsborough, Buderim, and Gympie. The winning exhibit, that of the Montville Fruitgrowers' and Farmers' Progress Association, as will be seen by the list of points awarded, led the way in citrus fruits and pineapples, and was especially strong in grading, packing, and general display. The points were allotted as follow:—

—	Possible Points	Montville.	Landsborough	Buderim.	Palmwoods.	Gympie.
Bananas	25	12	18	20	16	12
Pineapples	25	17	20	10	16	12
Citrus fruit	25	22	10	16	13	13
Custard apples	10	7	..	8	..	3
Papaws	10	9	8	7	8	6
Strawberries	10	6	3	..	3	7
All other fruits	15	10	9	3	5	10
Grading, packing, and general display	30	28	22	26	20	12
TOTALS	150	111	90	90	81	75

Special certificates were awarded as follows:—Pineapples, Landsborough and Glass House Mountains; bananas, Buderim Mountain; citrus, Montville; fruit packed for market, Montville.

DISTRICT EXHIBIT AWARDS.

"A" GRADE.

There were two entries for this competition, the Western District of New South Wales, and the Queensland South Coast District. The judges awarded the prize to the former, which scored 874 points out of a possible 1,390. The South Coast exhibit made a very creditable display, and was only 22 points behind the winner.

—	Possible.	South Coast.	Western N.S.W.
DAIRY PRODUCE—			
Butter	80	72	70
Milk	30	6	15
Cheese	40	34	33
Eggs	10	7	5
	160	119	123
FOODS—			
Hams and bacon	50	43	40
Beef and mutton	20	8	12
Sausages	10	10	4
Fish	10	4	4
Canned meats	25	20	12
Lard	15	13	13
Butchers' by-products	10	8	6
Honey	15	12	10
Confectionery	10	6	8
Bread	10	6	8
	175	130	117

—	Possible.	South Coast	Western N.S.W.
FRUITS—			
Fresh	60	50	40
Preserved	30	30	20
Dried	5	..	4
Vegetables	20	15	5
Preserved vegetables	10	7	10
Potatoes	20	17	10
Roots	14	8	4
Cocoanuts	6	3	..
Vegetable seeds	10	6	7
	175	136	100
GRAINS—			
Wheat	50	5	40
Maize	50	44	30
Barley	20	7	15
Oats	10	4	6
	130	60	91
MANUFACTURES—			
Woodwork	20	18	14
Ironwork	20	12	14
Leatherwork	20	14	15
Woollens	20	..	16
Tinwork	10	6	10
Manures	10	7	9
Brooms	10	8	10
Other manufactures	10	8	..
	120	73	88
MINERALS, ETC.—			
Gold	20	..	..
Coal	24	6	10
Stone	16	12	13
Woods	20	16	10
	80	34	33
TROPICAL PRODUCTS—			
Sugar-cane	60	40	..
Sugar	20	10	..
Spirits	10	7	..
Coffee	10	4	4
Cotton	30	7	8
Rubber	10	..	..
Oils	10	..	6
	150	68	18
WINES—			
Wines	15	5	15
Aerated waters	6	6	3
Cordials	9	7	4
Rum	10	10	..
	40	28	22
Tobacco	20	6	6

—	Possible.	South Coa	Western N.S.W.
HAY AND CHAFF—			
Hay	40	12	36
Grasses	10	5	9
Chaffs	40	15	35
Ensilage	20	8	12
Sorghum	10	5	8
Fibres	10	4	6
Pumpkins	10	8	6
Hemp	10	..	..
Millet	10	7	7
	160	64	119
WOOL—			
Scoured	40	33	35
Greasy	60	40	60
Mohair	10	5	5
	110	78	100
LADIES' WORK—			
Needlework	10	9	9
Schoolwork	10	5	4
	20	14	13
Effective arrangement	50	42	44
TOTALS	1,390	852	874

"B" GRADE.

Competition in "B" Grade was very keen and the running up very close, Crow's Nest winning with 808 points, Fassifern coming second with 761, and Kingaroy third with 733 points, thus beating Gympie by only one point. The awards were as follow:—

—	Possible.	Fassifern.	Crow's Nest.	Gympie	Kingaroy.
DAIRY PRODUCE—					
Butter	90	81	80	78	80
Cheese	50	41	45	37	30
Eggs	10	6	9	5	6
	150	128	134	120	116
FOODS—					
Hams and bacon	50	35	35	33	30
Fish	10	6	6	5	7
Lard	15	10	12	6	5
Honey	15	10	10	8	9
Confectionery	10	8	8	8	8
Bread	10	9	9	8	10
	110	78	80	68	69

—	Possible.	Fassifern.	Clow's Nest.	Gympie.	Kingaroy.
FRUITS—					
Fresh	40	15	14	25	15
Preserved	40	35	30	30	30
Dried	5	3	4	2	3
Vegetables	20	15	14	14	7
Preserved vegetables	10	5	5	5	6
Potatoes	30	15	22	20	18
Roots	14	8	5	6	6
Cocoanuts	6	3	3	3	3
Vegetable seeds	10	6	6	5	5
	175	105	103	110	93
GRAINS—					
Wheat	60	15	54	10	49
Maize	60	53	52	52	42
Barley	20	6	14	9	12
Oats	10	6	6	5	8
	150	80	126	76	111
Bark	20	15	14	17	12
MINERALS, ETC.—					
Gold	20	3	15	15	10
Coal	10	5	7	5	5
Stone	10	4	6	4	7
Woods	20	18	12	14	15
	60	30	40	38	37
TROPICAL PRODUCTS—					
Sugar-cane	75	15	10	40	5
Coffee	10	..	3	5	..
Cotton	30	12	5	8	8
Oils	10	5	4	..	2
	125	32	22	53	15
WINES—					
Wines	15	10	15	5	11
Aerated waters	9	5	5	6	5
Cordials	6	6	4	5	4
	30	21	24	16	20
Tobacco	20	5	5	5	7
HAY AND CHAFF—					
Hay	50	30	20	26	28
Grasses	10	8	8	7	8
Chaffs	50	44	41	25	40
Ensilage	20	12	16	8	40
Sorghum	10	9	9	6	7
Fibres	10	7	4	5	4
Pumpkins	10	9	8	8	7
Hemp	10	4	4	4	3
Millet	10	9	7	8	8
	180	132	117	97	119
WOOL—					
Scoured	40	30	31	32	26
Greasy	60	48	46	47	46
Mohair	10	6	10	8	8
	110	84	87	87	80

—	Possible.	Fassifern.	Crow's Nest.	Gympie.	Kingaroy.
OSTRICH FEATHERS—					
Natural	10	..	10	..	3
Prepared	10	..	10	..	3
	20	..	20	..	6
LADIES' WORK—					
Needlework	10	8	8	6	7
Schoolwork	10	7	3	4	5
	20	15	11	10	12
Effective arrangement..	50	36	25	35	36
GRAND TOTALS	1,230	751	808	732	733

HOME MILKING TESTS.

THE RESULTS.

The following are the results of the different home milking tests conducted by the National Association for the various breeds. The conditions in each class were the same, namely:—Cow or heifer averaging the greatest daily yield of butter for forty-eight hours under Babcock test, milk to contain not less than 3 per cent. of butter fat. The test to be conducted on the farms by officers of the Department of Agriculture and Stock:—

AYRSHIRES.

—	—	Milk. Lb.	Test.	Commercial Butter.	Total, 48 Hours.
					Lb.
F. A. Stimpson's Rosette 3rd of Hilltop Plain ..	M.	26	3·28	1·00	
	E.	32	3·65	1·37	
	M.	33	4·65	1·80	
	E.	37	4·0	1·74	5·91
Jonas Holmes's Thelma of Myrtleview	M.	25	3·8	1·11	
	E.	24	4·0	1·12	
	M.	27½	3·6	1·15	
	E.	25½	3·9	1·16	4·54
Jonas Holmes's Tidy B. V. of Invercauld	M.	26	3·8	1·16	
	E.	22	4·4	1·13	
	M.	25	3·7	1·08	
	E.	21	4·4	1·08	4·45
John Anderson's Jeanette R. 2nd of Invercauld ..	M.	22½	4·9	1·29	
	E.	16½	5·3	1·03	
	M.	19	4·6	1·03	
	E.	18	5·0	1·06	4·41
W. F. Hammel's Sweet Marie	M.	28½	3·4	1·14	
	E	30	3·2	1·13	
	M	26	3·4	1·04	
	E	25½	3·6	1·08	4·39

AYRSHIRES—*continued.*

—	—	Milk. Lb.	Test.	Commercial Butter.	Total, 48 Hours.
					Lb.
J. H. Paten's Jeanette of Wanora	M	20½	4·0	·95	
	E	17	4·8	·96	
	M	21½	3·8	·96	
	E	16	4·6	·86	3·73
Jonas Holmes's Peggy..	M.	18	3·7	·78	
	E.	17½	4·2	·86	
	M.	20½	4·0	·95	
	E.	17	4·3	·85	3·44
F. A. Stimpson's Affection of Gowrie Park ..	M.	17	3·8	·76	
	E.	18½	3·6	·77	
	M.	19½	3·95	·89	
	E.	20½	3·3	·78	3·20
F. A. Stimpson's Model	M.	20	4·2	·98	
	E.	18	3·4	·72	
	M.	18½	3·7	·79	
	E.	19	2·9	·63	3·12
Jonas Holmes's May Mischief of Invercauld ..	M.	20	3·0	·69	
	E.	18½	3·4	·72	
	M.	22½	3·6	·94	
	E.	17	3·7	·73	3·08

The Ayrshire Herd Society's test is the same as above, with the exception that "Sweet Marie" did not compete.

MILKING SHORTHORNS.

Nestle and Anglo-Swiss Condensed Milk Co.'s Butterfly	M.	26	4·0	1·21	
	E.	17	4·8	·96	
	M.	23	3·6	·96	
	E.	16	4·9	·92	4·05
M. Lawrence's Dairymaid of City View	M.	20	2·4	·55	
	A.	17¼	3·5	·70	
	N.	14	3·5	·57	
	M.	18	3·1	·65	
	A.	16	4·5	·85	
	N.	16	3·0	·55	3·87
McIntyre Bros.' Lark 2nd	M.	22½	3·0	·79	
	E.	20	3·6	·84	
	M.	22¾	3·0	·80	
	E.	22	3·4	·88	3·31
Nestle and Anglo-Swiss Condensed Milk Co.'s Necklace	M.	15	3·5	·61	
	E.	10	4·5	·53	
	M.	14	3·8	·62	
	E.	10	4·1	·48	2·24

ILLAWARRAS.

E. D. Dunn's Blossom 3rd	M.	22	3·4	·88	
	A.	17½	4·2	·86	
	N.	14½	4·8	·82	
	M.	20	3·0	·70	
	A.	20½	4·2	1·01	
	N.	16¼	4·6	·88	5·15
H. Marquardt's Champion	M.	27	3·0	·94	
	E.	28	4·2	1·38	
	M.	26	3·2	·97	
	E.	27	5·0	1·59	4·88

ILLAWARRAS—*continued.*

—	—	Milk. Lb.	Test.	Commercial Butter.	Total, 48 Hours. Lb.
A. T. Waters's Tulip of Railway View	M.	19¾	3·2	·73	
	A.	16½	3·8	·73	
	N.	15½	4·4	·79	
	M.	19¼	3·5	·78	
	A.	14¼	4·2	·70	
	N.	12¾	5·6	·83	4·56
H. Marquardt's Shamrock	M.	22½	3·3	·855	
	E.	23½	4·4	1·205	
	M.	27	3·8	1·20	
	E.	23	4·4	1·18	4·44
P. Biddle's Laurel	M.	15½	5·6	1·02	
	E.	17½	5·2	1·07	
	M.	16½	5·5	1·07	
	E.	17½	5·2	1·07	4·23
S. Mitchell's Pendant	M.	25	3·8	1·11	
	E.	16	4·8	·90	
	M.	24½	3·8	1·09	
	E.	17	4·6	·92	4·02
S. Mitchell's Plum	M.	24	3·6	1·00	
	E.	18¼	4·4	·95	
	M.	23	3·8	1·03	
	E.	18	4·3	·90	3·88
D. Dunn's Jemima 3rd	M.	21	3·0	·74	
	A.	13	3·2	·49	
	N.	14	3·8	·62	
	M.	20½	2·8	·67	
	A.	17½	2·9	·58	
	N.	16	4·1	·77	3·87
H. Dickfos's Beauty of Booie	M.	27½	2·7	·855	
	E.	24¾	3·4	·98	
	M.	30	2·8	·97	
	E.	23¾	3·5	·97	3·775
Nestle and Anglo-Swiss Condensed Milk Co.'s Charm	M.	17	3·8	·76	
	E.	11	5·8	·75	
	M.	17	4·0	·79	
	E.	12	4·8	·67	2·97
HOLSTEINS.					
S. H. Hocking's Psyche of St. Gwithian	M.	30	3·1	1·08	
	E.	27½	3·6	1·15	
	M.	28	3·0	·97	
	E.	26	3·6	1·09	4·29
Nestle and Anglo-Swiss Condensed Milk Co.'s Nolly 2nd of Kabibinska	M.	24½	2·4	·70	
	E.	20	3·3	·74	
	M.	24	2·6	·74	
	E.	20	3·4	·79	2·97
S. H. Hocking's Fraulein 3rd of St. Gwithian ..	M.	18½	3·45	·725	
	E.	13	3·6	·54	
	M.	18	3·5	·73	
	E.	14	3·3	·54	2·535
F. C. Gratton's Lunta 7th of Brundee	M.	16	3·2	.602	
	E.	14	3·2	·527	
	M.	17	3·1	·620	
	E.	14	3·5	·576	2·325

ADVANCE RESULTS.

On the night of the 17th instant the following results were declared in connection with two of the milking competitions conducted by the National Association. The other competitions for which lactation points had to be considered were not disclosed. The figures may be open to correction:—

COW, 4 YEARS OLD AND OVER, AVERAGING THE GREATEST DAILY YIELD OF BUTTER FAT FOR 48 HOURS.

—	Milk.		Commercial Butter.	
	Lb.	oz.	Lb.	oz.
D. Dunn's Blossom III.	100	13	4	6¾
W. F. Hammel's Sweet Marie	111	1	4	4⅘
A. T. Waters's Tulip of Railway View	98	11	4	3⅒

COW YIELDING THE LARGEST SUPPLY OF MILK IN 48 HOURS.

W. F. Hammel's Sweet Marie, 111 lb. 1 oz.

BUTTER AWARDS.

The entries for the butter competition were far more numerous this year than at any previous show at Bowen Park, and competition was very keen. The special prize for the greatest aggregate number of points in all classes fell to the Toowoomba factory of the Darling Downs Co-operative Dairy Company, which scored 468 out of a possible 500 points.

In the unsalted class the first prize went to the Downs Co-operative Dairy Company, with 95 points, and the Logan and Albert Company was only half a point behind. The Boonah Factory of the Queensland Co-operative Dairy Company and the Wide Bay Co-operative Company were very highly commended. They scored 93½ and 93 points respectively. Ninety-five points were also gained by the Downs Company in the fresh class, the Grantham factory of the Queensland Co-operative Company and the Logan and Albert Company filling the places, with 94½ and 92½ points respectively. The Texas factory of the Warwick Company was successful in the export class (30 days' storage), with 95 points. The Downs Company came next with 93, and the Maleny Company with 92½. The Warwick Company also gained the special prize. With 94 points the Downs Company won the eight weeks' storage class, beating the Allora factory of the Warwick Company by 1½, and the Oakey Company by 2 points. The awards were made on the following scale of points:—Flavour, mild, mellow, nutty, 65; texture, even, granular, 20; colour, light, straw, or biscuit, 7; salting, should be sufficiently salted without destroying the natural flavour peculiar to butter, 4; packing and finish, non-vacuous; package also to count, 4. Total, 100.

UNSALTED, FACTORY MADE.

Box butter made at farm dairy, C. Bloss, Gympie, 90 points.

	Flavour.	Texture.	Colour.	Salting.	Packing.	Total.
Queensland Co-operative Dairy Company—						
Booval	57	18	7	4	4	90
Boonah	59	19½	7	4	4	93½
Grantham	57½	19½	7	4	4	92
Laidley	57½	19	7	4	4	91½
Gayndah Co-operative Dairy Company	56	19	7	4	3	89
Marburg Butter Factory	57	19	7	4	3½	90½
Stanley River Co-operative Dairy Company	57	19	7	4	3	90
Goombungee Co-operative Dairy Company	57	18½	7	4	3½	90
Oakey District Co-operative Dairy Co.	57	19	7	4	3	90
Kin Kin Co-operative Dairy Company	56½	18½	7	4	3	89
Caboolture Co-operative Dairy Company	56	18½	7	4	3	88½
Maleny Co-operative Dairy Company	56	18½	7	4	3	88½
Warwick Butter and Dairying Company—						
Millhill	57½	19	7	4	2½	90½
Allora	58½	19	7	4	3	91½
Mount Bismarck Co-operative Dairy Co.	57	18½	7	4	3½	90
Esk Co-operative Dairy Company	57½	19½	7	4	3½	91½
Atherton Tableland Co-operative Company	57	19½	6	4	3½	90
Killarney Dairy Company	54	18½	7	4	3	86½
Silverwood Co-operative Dairy Company—						
Terror's Creek	57	18½	7	4	2½	89
Gatton	57½	19	7	4	2½	90
Downs Co-operative Dairy Company—						
Dalby	54	18½	7	4	3½	87
Toowoomba	61	19½	7	4	3½	95
Maryborough Co-operative Dairy Co.—						
Maryborough	57½	19	7	4	3½	91
Kingaroy	55	20	7	4	3½	89½
Biggenden	56½	19	7	4	3½	90
Mundubbera	56	19½	7	4	3½	90½
Wide Bay Co-operative Dairy Company	60	19	7	4	3	93
Logan and Albert Co-operative Dairy Co.	59½	19½	7	3½	3	93½
FRESH, FACTORY MADE.						
Queensland Co-operative Dairy Company—						
Booval	56	18½	6½	4	3½	88½
Boonah	57	19	6½	3½	4	90
Grantham	60	19½	7	4	4	94½
Laidley	56	18	7	3	4	88
Gayndah Co-operative Dairy Company	57	18½	6	4	3	88½
Marburg Butter Factory	55	18½	7	3	3½	87
Stanley River Co-operative Dairy Co.	57	19	6½	3½	3½	89½
Goombungee Co-operative Dairy Company	55	18½	6½	4	3	87½
Oakey District Co-operative Dairy Co.	57½	18½	6½	4	3	89½
Kin Kin Co-operative Dairy Company	58	18½	7	4	3	90½
Caboolture Co-operative Dairy Company	57	19	7	4	3	90
Maleny Co-operative Dairy Company	58½	18½	7	4	3½	91½
Warwick Butter and Dairying Company—						
Millhill	56½	19	6½	3½	3½	88
Allora	57	18½	6½	3½	3½	89
Mount Bismarck Co-operative Dairy Co.	56½	19	7	3½	3	89
Esk Co-operative Dairy Company	56½	19	7	4	3	89½
Atherton Tableland Co-operative Company	54	19	5½	4	3½	86
Killarney Dairy Company	55	18½	6½	3½	2½	86
Silverwood Dairy Farmers' Company—						
Terror's Creek	57½	19	7	4	3½	91
Gatton	59	18½	6½	3½	3	90½
Downs Co-operative Dairy Company—						
Dalby	56½	18½	6½	4	3½	89
Toowoomba	61	19½	7	4	3½	95

FRESH, FACTORY MADE—*continued.*

—	Flavour.	Texture.	Colour.	Salting.	Packing.	Total.
Maryborough Co-operative Dairy Co.—						
Maryborough	54	18	7	4	3½	86½
Kingaroy	55	18½	7	4	3½	88
Biggenden	57	18½	6½	3½	3½	89
Mundubbera	57½	19	6	4	3½	90
Wide Bay Co-operative Dairy Company	57½	19	6½	4	3½	90½
Logan and Albert Co-operative Dairy Co.	59½	18½	7	3½	3	93½

THIRTY DAYS' STORAGE, SUITABLE FOR EXPORT.

—	Flavour.	Texture.	Colour.	Salting.	Packing.	Total.
Queensland Farmers' Company—						
Booval	55	18½	5½	4	3½	86½
Boonah	56½	19	6½	4	4	90
Grantham	57	19½	6½	4	4	91
Laidley	56½	18½	5	4	4	88
Gayndah Co-operative Dairy Company ..	57	19½	7	4	3½	91
Marburg Butter Factory	56	18	6	3½	3½	87
Bundaberg Co-operative Dairy Company	56	18½	6	3	3½	87
Stanley River Co-operative Dairy Company	54	19	6½	4	3	86½
Goombungee Co-operative Dairy Company	57	18½	6	4	3	88½
Oakey District Co-operative Dairy Company	53	19	6½	4	3½	86
Kin Kin Co-operative Dairy Company ..	57	18	6	4	3½	88½
Caboolture Co-operative Dairy Company	55	20	7	4	3½	89½
Maleny Co-operative Dairy Company ..	59½	19	6½	4	3½	92
Warwick Butter and Dairying Company—						
Mill Hill	55	18½	6½	4	3½	87½
Allora	58	19½	7	3½	3	91
Texas	61	19½	7	4	3½	95
Mount Bismarck Co-operative Dairy Co.	57	18½	7	4	2½	89
Esk Co-operative Dairy Compamy ..	56	19½	7	4	3½	90
Downs Co-operative Dairy Company—						
Dalby	57	19	6½	4	3½	90
Toowoomba	60	19	6½	4	3½	93
Silverwood Dairy Farmers—						
Gatton	55	19	7	4	2½	87½
Terror's Creek	56½	18½	6½	4	3½	89
Atherton Tableland Company	55	19	6	4	4	88
Killarney Dairy Company	54	18½	6	4	4	86½
Logan and Albert Co-operative Dairy Co.	57	20	7	4	3½	91½

SPECIAL PRIZE, THIRTY DAYS' STORAGE.

—	Flavour.	Texture.	Colour.	Salting.	Packing.	Total.
Queensland Farmers' Company—						
Booval	52	18	6	3½	4	83½
Boonah	54	19	7	4	4	88
Grantham	58	19½	7	4	4	92½
Laidley	55	19	6	4	4	88
Gayndah Co-operative Dairy Company ..	55	19½	7	4	3	88½
Marburg Butter Factory	54	18½	6½	3½	3½	86
Stanley River Co-operative Dairy Company	52	19	6	4	3	84
Oakey District Co-operative Dairy Co. ..	51	19	6½	4	3½	83½
Kin Kin Co-operative Dairy Company ..	54	19	6½	4	3½	89
Caboolture Co-operative Dairy Company	53	19½	6½	4	3½	86
Maleny Co-operative Dairy Company ..			(Disqualified)			
Warwick Butter and Dairying Company—						
Mill Hill	54	19	7	4	3½	87½
Allora	57½	19½	7	4	3½	91½
Texas	60	19	6½	4	3½	93
Mount Bismarck Co-operative Dairy Co.	54	19½	7	4	4	88½
Esk Co-operative Dairy Company ..			(Disqualified)			
Downs Co-operative Dairy Co., Toowoomba	57	19½	6½	4	3½	91
Silverwood Dairy Farmers—						
Gatton	52	19	6	3½	3½	84
Terror's Creek	54	18½	6½	3	3	85
Atherton Tableland Company	54	19	6	4	3½	86½
Logan and Albert Co-operative Dairy Co.	52	19½	7	4	3	85½

EIGHT WEEKS' STORAGE, SUITABLE FOR EXPORT.

—	Flavour.	Texture.	Colour.	Salting.	Packing.	Total.
Queensland Farmers' Company—						
Booval	56	18½	5½	4	3½	87½
Boonah	57½	19	6½	4	4	91
Grantham	51	19½	7	4	4	85½
Laidley	57	19½	5½	4	4	90
Gayndah Co-operative Dairy Company ..	57	20	7	4	3½	91½
Marburg Butter Factory	58	18½	6	3½	3½	89½
Bundaberg Co-operative Dairy Company..	55	18½	6	4	3½	87
Stanley River Co-operative Dairy Company	52	19	6½	4	3½	85
Oakey District Co-operative Dairy Co. ..	58½	19½	6½	4	3½	92
Caboolture Co-operative Dairy Company	54	19½	7	4	3½	88
Warwick Butter and Dairying Company—						
Mill Hill	53	18½	5	4	3½	84
Allora	59½	19½	6½	4	3	92½
Texas	52	19½	7	4	3½	86
Mount Bismarck Co-operative Dairy Co.	57	19½	7	4	3	91
Esk Co-operative Dairy Company ..	56	19½	7	3½	3½	89½
Downs Co-operative Dairy Company—						
Dalby	55	19	6½	4	3½	88
Toowoomba	60½	19	7	4	3½	94
Silverwood Dairy Farmers—						
Gatton	53	18	6	3½	3	83½
Terror's Creek	56	18½	6½	4	3	88
Atherton Tableland Company	53	19	6½	4	3½	86
Logan and Albert Co-operative Dairy Co.	52	19	6	3½	3½	86

CHEESE.

There were 146 entries of cheese this year. Space will not allow of the publication of the details of the award, but the results were as follow:—

In the export classes, white and coloured cheeses respectively, the Downs Dairy Company, Limited, was successful in gaining premier honours, with 93 points in each. The Biddeston Co-operative Dairy Company, Limited, followed in the former with 91 points, with Kooroongarra Co-operative Dairy Company, Limited, 90½, third. In the latter (coloured) the Lauriston Co-operative Dairy Company, Limited, secured second place with 91½, and the Pittsworth Dairy Company, Limited, third with 91. No fewer than twenty-six exhibits were displayed in the class medium cheeses, matured, and the blue ribbon went to the Greenmount Dairy Company, Limited's, No. 2 factory, with 92½ points, the Rosalie factory, Glencoe, securing 92, and the same company's Jondaryan factory 91½. In the two medium cheeses, under two months old, there was also a remarkably large entry. The distinction of first place was gained by the Pittsworth Dairy Company, Limited, Springside, with 92½ points, the Rosalie Cheese Factory, Glencoe, being only half a point behind, while a similar margin separated the Jondaryan factory of that company for third place. The honours in the loaf cheeses, matured class, went to the Rosalie Cheese Factory, Glencoe, with 93 points, the Warwick Butter and Dairying Company, Bony Mountain, 92½, was second, and the Mount Bismarck Dairy Company, Limited, followed closely with 92.

The under two months old loaf cheeses also attracted a big display, and the Rosalie Cheese Factory, Jondaryan, headed another very close contest with 93½ points. The Glencoe factory was runner-up with 93, and the Southbrook Dairy Company—last year's winner—was third with 92½.

PIG AWARDS.

Mr. Shelton, the judge, in speaking to a "Daily Mail" representative, said:—"The quality of the prize-takers at this year's show is excellent. Those that have not scored," he added, "have lost point either because they had not the quality or had not been properly prepared. Something more than a drop of oil is required to bring an animal up to show condition. One wants to commence weeks, or months, beforehand, if the animals are to be in tip-top condition, and though it is not necessary to over-fatten an animal, and so impair the breeding capacity, it is necessary that some preparation should be given. The Show Committee appears to have done its part, but exhibitors are not as numerous as they ought to be, and to make the show of more educational value something should be done for those who are unsuccessful in order that they may be better informed and prepared for future shows."

Improved Berkshires.—Boars: 2 years and over, Macfarlane Bros.' Onward 1 and champion; 1 to 2 years, Goodna Hospital for Insane's Goodna Serang; under 1 year, same owner's Kitchener 1, W. J. Warburton's Thunderbolt 2; under 6 months, Goodna Hospital for Insane's Daniel 1, W. J. Warburton's Tricky 2; family group, Macfarlane Bros.' Onward and progeny. Sows: 2 years and over, Macfarlane Bros.' Miss Request 1 and champion; 1 to 2 years, W. J. Warburton's Topsy; under 1 year, Goodna Hospital for Insane's Kitchen Maid 1, J. B. Freney's Bedmont 2; under 6 months, Goodna Hospital for Insane's Topsy 1, W. J. Warburton's Northgate Beauty 2; any age, with litter not over 6 weeks old, W. J. Warburton's Florence.

Yorkshires.—Boars: 2 years and over, W. J. Warburton's Rupert's Pride 1 and champion; 1 to 2 years, Gatton College's Adventurer of Wharfdale; under 1 year, W. J. Warburton's Northgate Boy 1, Gatton College's Pride of the Manor 2; under 6 months, W. J. Warburton's Northgate Rambler. Sows: 2 years and over, W. J. Warburton's Northgate Choice 1, same owner's Northgate Nell 2; 1 to 2 years, W. J. Warburton's Rose Flack; under 1 year, W. J. Warburton's Northgate Duchess 1, Gatton College's Laura Lass 2; under 6 months, W. J. Warburton's Snowdrop 1, same owner's Curley 2.

Tamworths.—Boars: 2 years and over, Dunwich Asylum's Stradbroke Sunrise; 1 to 2 years, D. W. Evans's Royal King 1 and champion; under 6 months, Dunwich Asylum. Sow, under 1 year, D. W. Evans's Indian Queen 1 and champion.

Miscellaneous.—3 bacon pigs, 100 lb. to 150 lb., W. J. Warburton; 3 bacon pigs, any breed or cross, 120 lb. to 150 lb., W. B. Osborne. Sow, with litter not over 6 weeks old, not fewer than 6 suckers, any breed, E. Vinter's Stella and progeny.

Pastoral.

A NEW PARASITE ON SHEEP MAGGOT FLIES.

Notes and Description of a Chalcid Parasite.

(*Chalcis calliphoræ.*)

BY W. W. FROGGATT, F.L.S., Government Entomologist, in the "Agricultural Gazette of New South Wales."

An important discovery in the economy of blowfly maggots was made at the Government Sheep-fly Experiment Station at Wooloondool, near Hay, in the early part of April. While in charge of the laboratory work, during the temporary absence of the officer-in-charge, Mr. T. McCarthy, entomological assistant, reported the discovery of a new parasite attacking blow-fly maggots.

He says: "Some fresh meat was placed in a tin with some soil outside the laboratory, where it was soon blown by the common yellow blow-fly (*Calliphora oceariæ*). The maggots were left outside until they began to pupate, when they were brought inside and placed in the breeding cage with the small parasites (*Nasonia brevicornis*) for them to parasite. Later on, I was surprised to find two large hymenopterous parasites in the cage with the smaller ones, breeding out of the pupæ. On examining the remaining pupæ, I found that instead of them containing a number of the small Nasonia pupæ, many contained a single large pupa, evidently that of the new parasite. Thinking it might be a case of hyperparasitism, both the new and the old parasites were placed in a glass cylinder with a supply of fresh fly pupæ, but while the little Nasonia wasps as usual set to work and parasitised the fly pupæ, the new Chalcis parasite took no notice of them. I then obtained some fresh full-grown active blow-fly maggots, and placed them in another glass cylinder, and introduced the new Chalcis parasites, which immediately went for the active maggots, and clinging to them with their stout legs punctured the skin and inserted their sharp needle-like ovipositors."

These parasitised maggots soon afterwards pupated without any apparent difficulty, and later on Mr. McCarthy bred out a large number of the new Chalcis parasite, and with them parasitised a large quantity of blow-fly maggots, which have since pupated, and are now hibernating in the fly pupal cases.

Mr. McCarthy made further experiments by placing the fly pupæ that had been previously parasitised by the large Chalcid wasp in the maggot state in a glass cylinder with some Nasonia wasps, but they refused to puncture them though freely parasitising the fresh uninfected pupæ mixed with them.

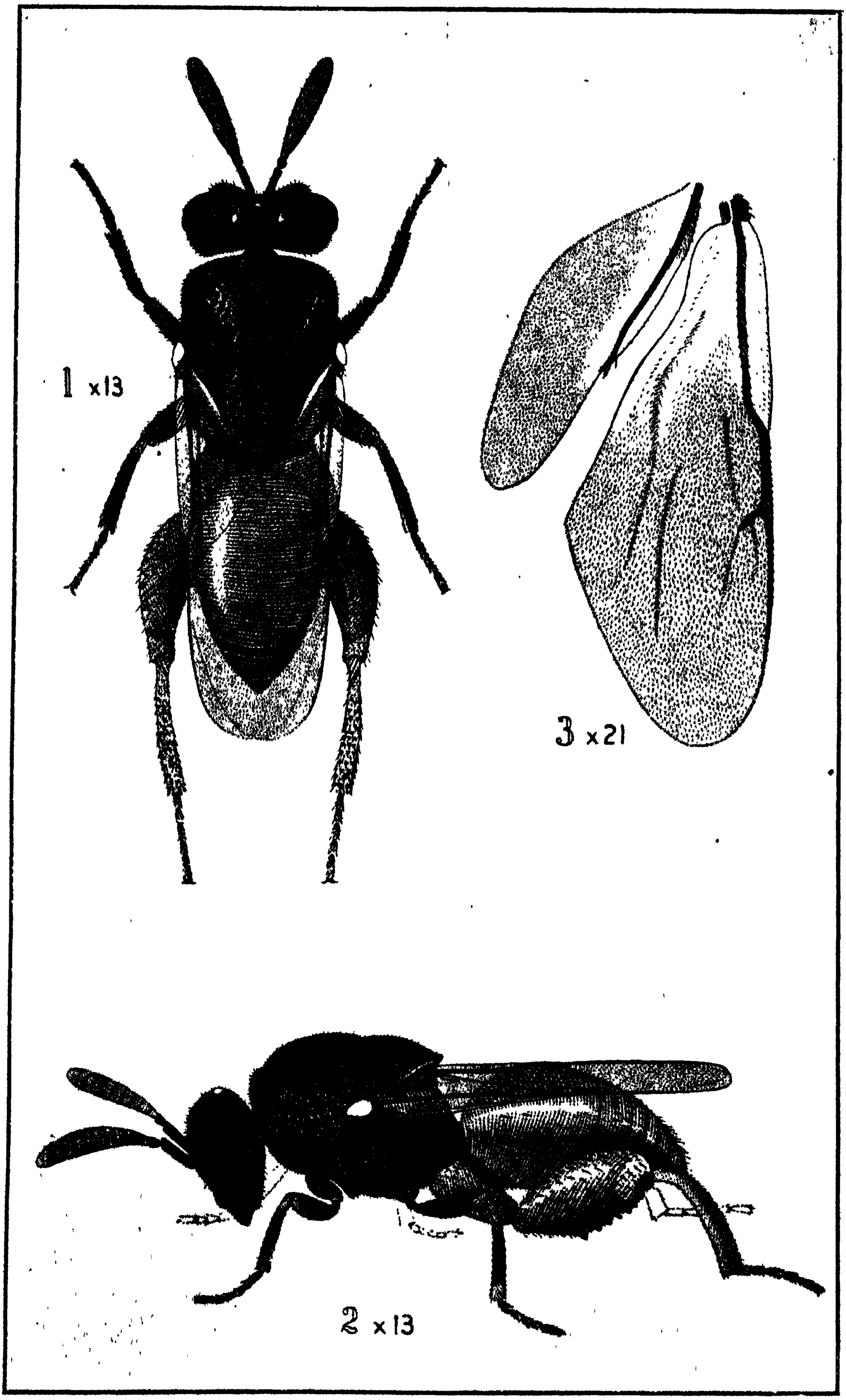


PLATE 22.—A NEW PARASITE ON SHEEP MAGGOT FLIES.
1. Dorsal view of *Chalcis calliphoræ*. 2. Side-view of same.
3. Enlarged view of one of the wings.

The discovery of a parasite which attacks the blow-fly maggots before they pupate may be another important factor in the control of these pests, and, though only a single Chalcid wasp emerges from each fly pupa, and the increase is not so rapid as the more prolific Nasonia, yet finding out the maggots before they seek cover, or have time to pupate, may be a great advantage in fighting the blow-flies.

The new parasite is quite as hardy, and as easy to handle and breed as the former one, will feed in captivity, and will stand a long journey by post in a packet.

This handsome little, thick-legged, black wasp belongs to the typical Genus Chalcis, and is very distinct in markings and coloration from any species known to the writer. It is about the size of the common house-fly, with the antennæ reddish yellow, and the thickened hind legs and oval abdomen shining reddish brown. Nearly all the members of the Genus Chalcis are parasitic on the caterpillars of small moths, and are seldom found parasitising the larvæ of other orders of insects.

The following is a technical description of this fine parasite, which is quite distinct from any name species known to the writer, and for which he proposes the following distinctive name:—

CHALCIS CALLIPHORÆ, N.SP.

Male.—Head, thorax, the two basal joints of the antennæ, basal portion of the femora and central portion of the tibia of the forelegs, black. The ten terminal joints of the antennæ are dull reddish brown. Wings hyaline, covered with short, fine scattered hairs, nervures black, tegulæ pale yellow to almost white. Legs: Fore and second pair of legs mottled with yellow at the apex; hind legs and abdomen bright, shining, light reddish brown, the former blotched with yellow on the apex of the femora and tibia.

Female.—Head broad, rugose and deeply punctate, face clothed with fine scattered hairs; the antennæ springing from a cavity in the front of the head, scape long, second joint small, third to tenth fusiform, thickened, and the terminal one longest and rounded at the apex; the eyes large, projecting; ocelli large. Thorax broad, very rugose and deeply punctate, apex of the scutellum terminating with two blunt pointed projections. Wings normal. Legs clothed with fine scattered hair; fore and second pair with the femora short, cylindrical, and swollen in the centre; tibia slender, tarsi long, very hairy; hind legs; trochanter large, femur large, swollen, oval, furnished on the outer margin of the under side with a row of eight short, black-thorn shaped spines, a ninth nearer the apex, and the apex terminating in a longer spine; the tibia of a uniform thickness curved round and fitting close against the under-surface of the femora, the tip on the inner margin produced into a curved thickened spine. Abdomen with a very short stalk (almost sessile), broadly rounded at the base, oval, and tapering to the apex; ovipositor, when at rest, hidden. Length from front of head to tip of abdomen ⅛th of an inch. Locality, Wooloondool, near Hay, New South Wales.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF JULY, 1916.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Queen Kate	Ayrshire	15 June, 1916	1,116	4·0	52·41	
Nina	Shorthorn	24 June ,,	1,079	3·5	44·18	
Thornton Fairetta	Jersey	26 May ,,	729	4·9	42·14	
Bluebelle	,,	22 June ,,	786	4·5	41·65	
Princess Kate	Ayrshire	21 June ,,	803	4·2	39·64	
Lady Melba	Holstein	28 Oct , 1915	726	4·5	38·47	
Cocoatina	Jersey	17 Mar., 1916	526	5·3	32·94	
Auntie's Lass	Ayrshire	4 April ,,	615	4·4	31·85	
Lady Margaret	,,	14 Oct., 1915	594	4·5	31·48	
Lady Loch II.	,,	17 Mar., 1916	568	4 7	31·47	
Iron Plate	Jersey	20 Jan. ,,	526	5·0	31·04	
Mistress Bee	,,	21 Jan. ,,	484	5·3	30·32	
Constancy	Ayrshire	24 Nov., 1915	448	5·6	29·67	
Belinda	,,	27 Feb., 1916	594	4·1	28·61	
Rosine	,,	5 July ,,	547	4·4	28·32	
Miss Mischief	,,	15 June ,,	501	4·7	27·76	
Charity	Jersey	28 May ,,	483	4·7	26·75	
Lady Mitchell	Holstein	3 June ,,	488	4·6	26·44	
Lady Spec	Ayrshire	6 Jan. ,,	511	4·3	25·85	
Lady Lark	,,	24 June ,,	494	4·4	25·58	
Netherton Belle	,,	23 April ,,	428	5·0	25·25	
Violette's Peer's Girl	Jersey	8 Dec., 1915	390	5·3	24·42	
Twylish's Maid	,,	22 Oct. ,,	329	6·2	24·16	
Lady's Maid	Shorthorn	26 Jan., 1916	504	4·0	23·67	
La Hurette Hope	Jersey	17 Nov , 1915	342	5·6	22·64	
Lowla II.	Shorth'rn-Ayrshire	6 July, 1916	517	3·7	22·41	
Jeannie	Ayrshire	1 Nov., 1915	444	4·0	20·84	
Lerida II.	,,	12 June, 1916	426	4·1	20·51	
Red Lark	,,	21 June ,,	459	3·8	20·44	

During the early part of the month the cows were fed on lucerne chaff and Soudan grass, but during the latter part of the month they were fed on maize silage and Cape barley.

THE AGRICULTURAL BANK.

COMMISSION OR PROCURATION FEE BEING CHARGED ON ADVANCES OBTAINED FROM AGRICULTURAL BANK.

It having come to the knowledge of the trustees of the Agricultural Bank that certain agents have charged clients of the bank a procuration fee or commission for obtaining an advance from the bank, the trustees desire it to be known that as an agent or any other person has no influence whatever in obtaining an advance from the bank, a procuration fee or commission should not be paid by clients for assistance from the bank.

The Horse.

THE MULE FOR AUSTRALIA.

The great value of the mules in modern warfare, especially for transport work in mountainous country, has been amply demonstrated during the course of the present war. Some time ago a very good article appeared in "The Agricultural Journal," of Victoria, the gist of which we give in these notes on mule-breeding. The mule, which is greatly prized and valued in many countries of the old and new world, either for riding, traction, general farm purposes, or as a pack animal, has never been adopted, except in very isolated cases, by Australians for any of these purposes.

Mules were employed many years ago by Messrs. Cobb and Company for their coaches between Ravenswood and Townsville, and proved very satisfactory, although the leaders sometimes took it into their heads to turn back and look into the coach to see how many passengers there were, or else they would wait until the most precipitous and narrowest part of the range road was reached, when they would incline to the very edge of the precipice and scratch themselves against trees, resisting all the blandishments of the driver until they had finished their scratch.

In North and South America the mule is universally recognised as a most reliable animal for farm work, and it there almost completely usurps the place of the horse. It is the reverse in Australia, although why this should be so is not very clear. We hear a great deal about the number of light mares and horses running on Australian pastures, which have cost as much to produce as £20-horses, and yet are dear at £5. Could these mares not be put to some profitable use? It was stated in "The Agricultural Journal of Victoria" for October, 1905, that many of these could be used for breeding mules. The raising of mules in the United States and in other countries is a very extensive and profitable industry. At a recent sale of donkeys in America, at Limestone Vale Farm, 59 of these animals were sold. Of them, 29 were jacks and 30 jennets. They averaged £96 10s. A jack, foaled in 1901, brought 280 guineas, and the average for the 29 jacks was something under £150. The jennets averaged £45 each, and some went as high as 170 guineas. How do our Queensland horse sales show against this? In connection with this particular sale, the "Breeders' Gazette" says:—"It was a square deal auction from start to finish. Every known defect of the animals was mentioned by the proprietors before the auctioneer asked for bids. Every animal in the catalogue was sold." Whether these defects refer only to unsoundness or to structural defects and vices we know not, but we can hardly imagine a horse-owner or any other owner in this country pointing out to intending exhibitors the faults of their animals. There seems, however, to be a moral in this sale, for it is also mentioned that the sale was conceded to be the most successful public sale of this class of stock ever held in Missouri. It would be a distinct innovation to hear before an auction in this country some such announcement as this: 'Gentlemen, lot 1, as you may observe, is an oldish mare. She may or may not breed again, but it really does not matter much. She has bred a few things—mostly weeds, which never paid the service fee and their board. You may also observe that her feet are none too good, but she is well provided with sidebone, and that splint is fairly prominent. Her wind might be better. She is much too narrow, and looks much like a gelding at the head. You should also notice that her action leaves something to be desired. I might mention, however, she is particularly active when anyone is within striking distance of her heels, and there are one or two other trifles, such as crib biting, &c. Now, gentlemen, start me.' "

In what are mules preferable to horses?

In the first place, a mule is not bred for speed, but for endurance. He does not make a good roadster, he is not stylish, but what he lacks in speed and beauty he makes up in actual usefulness on the farm. A few of the good points about a mule are: He is easy to raise. He eats very little as compared with a horse. Owing to his persistent uniform gait, long-sustained, a good mule will beat a horse on a journey. With respect to sickness, few people have ever seen a sick mule. He is proof against diseases which usually attack a horse. Even the African tsetse fly gives the mule best. In proportion to size, he will pull more than a horse and "stay" longer. He will endure hardships which would kill the best horse foaled. He does not seem to be injuriously affected by heat or cold. He is much easier to break in than a horse, and, once broken in, is more reliable, being dogged and persevering. His doggedness is usually called stubbornness. "As stubborn as a mule" has become a byword, but this stubbornness is one of the mule's best characteristics, because it is the trait which impels him to effort after effort to do the work imposed on him. He is occasionally vicious, but, as in the case of many vicious horses, this is a result of bad training. The "Tennessee Farmer" says that, if a mule team bolts, the mules all look after themselves. They will dodge and turn and avoid obstacles, whereas horses would run blindfold into any obstacle and kill or impale themselves in their blind madness. The Victorian journal quotes Mr. J. L. Jones, of Columbia, Tennessee, a well-known authority on mule-breeding, who says:—"There is no kind of labour to which a horse can be put for which a mule may not be made to answer, while there are many for which mules are more peculiarly adapted than horses; among the rest, that of mining, where the mule is used, and many of them need no drivers. The mule is better adapted for carrying burdens, for the plough, and agricultural machinery, for building railroads, and, in fact, for all kinds of heavy work. I have driven a 16-hand mule, out of a thoroughbred mare, in a buggy with two men and baggage 32 miles in four hours, and she was quite fit and ready to go on." The same journal says, in an article on "Mule-breeding," by W. T. Kendall, M.R.C.V.S.:—

KINDS OF MULE.

There are two kinds or classes of mule—viz., one the produce of the male ass, or jack, and the mare; and the other the offspring of the stallion and female ass or jennet. The cross between the jack and the mare is properly called the mule, while the other, the produce of the stallion and jennet, is designated a hinny. The mule is the more valuable animal of the two, having more size, style, finish, bone, and, in fact, all the requisites which make that animal so much prized as a useful burden-bearing animal. The hinny is small in size, and is wanting in the qualities requisite to a great draught animal. This hybrid is not supposed to breed, as no instance is known to us in which a stallion mule has been prolific, although he seems to be physically perfect, and shows great fondness for the female, and serves readily. There are instances on record where the female has produced a foal, but these are rare.

The mule partakes of the several characteristics of both its parents, having the head, ear, foot, and bone of the jack, while in height and body it follows the mare. It has the voice of neither, but is between the two, and more nearly resembles the jack. It possesses the patience, endurance, and sure-footedness of the jack, and the vigour, courage. and strength of the horse. It is easily kept, very hardy, and no path is too precipitous or mountain trail too difficult for one of them with its burden. The mule enjoys comparative immunity from disease, and lives to a comparatively great age. Pliny gives an account, taken from Græcian history, of one that was 80 years old, and, though past labour, followed those that were carrying material to build a temple. Dr. Reese mentions two that were 70 years old, in England. Mr. J. L. Jones knows of a mule in Middle Tennessee that, when young, was a beautiful dapple grey, but is now 30 years old, and is as white as snow. This mule is so faithful and true, and has broken so many young things to work by its side, that he bears the name of "Counsellor." The last time he was seen by Mr. Jones he was in a team attached to a reaper, drawing at a rate sufficient to cut 15 acres of grain per day.

THE KIND OF SIRE TO BREED FROM.

There are two kinds of jacks—the mule jack and the jennet jack, or combined jack, that is good for either mares or jennets, and is used chiefly in breeding jacks for stock purposes. It is only with the mule jack that we will deal, as the jennet jack is too costly to breed to mares, as a rule, unless the mares are of extra quality.

A good mule jack ought not to be less than 15 hands high, and have all the weight, head, ear, foot, bone, and length that can be obtained, coupled with a broad chest, wide hips, and with all the style attainable with those qualities. Smaller jacks often produce good mules, and when bred to large roomy mares show excellent results. Black with light points is a favourite colour, but many grey, blue, and even white jacks produce good mules. In America many varieties are to be met with—viz., the Catalonian, Andalusian, Maltese, Majorca, Italian, and Poitou, as well as a native jack. Of these, the Catalonian is considered the best. He is of good colour, possesses clean bone, and runs from 14½ to 16 hands. though he rarely reaches the latter. The Andalusian is about the same size, but of worse colour. The Maltese rarely exceeds 14½ hands, but is of fine quality. The Majorca is the largest, and frequently grows to 16 hands. The Italian is small, but a remarkably good breeder. The Poitou runs about 15 hands, and has heavy bones, long hair, and a good foot. The Kentucky jack, on account of the good grass and limestone formation, grows to a large size, and is preferred by many breeders to any of the imported varieties. These would probably form the best sires for Australia.

THE KIND OF MARE TO BREED FROM.

As already pointed out, the better the mare the better the mule, for it is found that the latter partakes very largely the body and shape of its mother. But, while always preferable to have a sound sire and a sound dam, there are many mares, and especially farm mares, with slight sidebones, or a tendency to ring-bone, or flat-footed, which, though unsuitable to breed to a draught or weedy thoroughbred stallion, would breed good useful mules, for these would not appear in the mule. As the mule is required for draught rather than speed, and increases in value with every inch of his height, and every pound in weight, it would be undesirable to use too weedy mares. It has been stated that the reason that farmers dislike breeding light horses, and prefer draughts, is that the latter can be put to work at two and a-half years old, and the mares worked at slow farm work while in foal, whereas this cannot be done with the lighter breeds, which are a continual source of expense, and earn no part of their livelihood until sold. What applies to draught horses equally applies to mules if the right sort of mares are used.

REARING THE MULE.

While the mule is capable of foraging for himself where an ordinary horse would starve, it is equally true that, with good feeding and kind treatment, he grows into a finer and more valuable animal. The young mule can be weaned at four months old, and will do well for himself if grass is plentiful, so that the dam need not be idle more than half the year; in fact, if well cared for, and only used for slow work, she may be almost worked the year round. At 2 years old the mule is easily broken. When accustomed to the feel of the harness, if he has already been broken to lead, he will take his place alongside a broken mule or horse, and go to work, and, if well fed, will do his share.

MARKET FOR MULES.

When speaking on this subject at the Farmers' Convention at Colac two years ago, I was asked by a farmer if I thought anyone would buy a mule if he bred one.. My reply was that if he bred one and worked him he would not want to sell him, but would lose no time in breeding more for himself or for sale. With proper encouragement to start it, mule-breeding will soon take care of itself; and whenever the local demand that will arise, when the true value of the animal is known, becomes supplied—and that will not be for many years to come—there is a ready market in India and other countries for all we can supply.

CONCLUSION.

In making comparisons between the horse and the mule, I do not wish to disparage the former, which I think the most beautiful as well as the most useful animal that has ever been domesticated by man. My only desire is to show that the patient, plodding mule possesses potentialities that are little dreamt of by the majority of Australians. For the explorer, the gold-seeker, the pioneer selector in the Gippsland or Otway Ranges, where vehicular traffic is impossible, or the struggling wheat-grower in the innermost Mallee fringe, the trusty mule is the animal *par excellence* to share his toil, and will well repay a trial.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JULY, 1916.

Eight thousand three hundred and forty-one eggs were laid during the month. Most of the birds are now doing good work. Cowan Bros.' Black Orpingtons win the monthly prize with 153 eggs. The following are the individual records :—

Competitors.	Breed.	July.	Total.
*T. Fanning	White Leghorns	141	470
*J. Zahl	Do.	147	444
*Mrs. J. Jobling, N.S.W.	Black Orpingtons	131	426
A. Howe, N.S.W.	White Leghorns	134	411
*Miss M. Hinze	Do.	139	402
*A. T. Coomber	Do.	126	402
*Dixie Egg Plant	Do.	124	394
G. H. Turner	Do.	135	389
*J. M. Manson	Do.	133	377
Dr. E. C. Jennings	Do.	136	376
W. Meneely	Do.	119	371
T. B. Hawkins	Do.	119	359
Geo. Tomlinson	Do.	129	354
J. R. Wilson	Do.	146	344
W. Lyell	Do.	111	338
J. M. Manson	Black Orpingtons	129	337
*E. A. Smith	White Leghorns	123	337
S. B. Tutin	Do.	107	335
*A. E. Walters	Do.	118	334
Geo. Prince	Do.	125	333
*E. F. Dennis	Do.	110	330
A. W. Bailey	Do.	113	327
*J. F. Dalrymple, N.S.W.	Rhode Island Reds	117	326
T. E. Jarman, N.S.W.	White Leghorns	114	317
Mrs. Munro	Do.	86	317
H. Jobling, N.S.W.	Black Orpingtons	108	312
C. P. Buchanan	White Leghorns	113	311
T. Taylor	Do.	116	310
Mrs. W. D. Bradburne, N.S.W.	Do.	117	309
A. F. Camkin, N.S.W.	Do.	130	308
H. W. Broad	Do.	101	303
*C. Knoblauch	Do.	121	303
*J. Anderson, Victoria	Red Sussex	93	303
*W. L. Forrest	White Leghorns	120	303
*Kelvin Poultry Farm	Do.	94	301
Mrs. C. Davis	Do.	119	297
*J. H. Gill, Victoria	Do.	123	296
*E. West	Do.	111	295
Cowan Bros., N.S.W.	Black Orpingtons	153	295
P. Brodie	White Leghorns	88	293
F. Clayton, N.S.W.	Do.	119	292
Kelvin Poultry Farm	Do.	102	292
R. Burns	S. L. Wyandottes	143	289
J. Gosley	White Leghorns	128	285
A. H. Padman, S.A.	Do.	100	283

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	July.	Total.
Mars Poultry Farm	White Leghorns	111	278
*W. H. Knowles, junr.	Do.	130	270
*J. H. Madrers, N.S.W.	Rhode Island Reds	117	264
King and Watson, N.S.W.	White Leghorns	109	257
T. Fanning	Black Orpingtons	121	257
E. Pocock	White Leghorns	119	256
J. Anderson, Victoria	Do.	128	251
R. Burns	Black Orpingtons	139	248
W. H. Forsyth, N.S.W.	Do.	119	246
W. Hirst, N.S.W.	White Leghorns	108	241
W. Purvis, S.A.	Do.	126	237
*J. W. Macrae	Black Orpingtons	124	231
F. Clayton, N.S.W.	Rhode Island Reds	116	231
E. F. Dennis	Black Orpingtons	126	226
J. G. Richter	White Leghorns	112	218
Cowan Bros., N.S.W.	Do.	104	212
W. Becker	Do.	105	211
G. W. Holland	Do.	75	202
L. K. Pettit, N.S.W.	Do.	96	186
Mars Poultry Farm	Black Orpingtons	114	182
Harveston Poultry Farm	White Leghorns	109	157
W. Lindus, N.S.W.	Do.	95	146
A. T. Coomber	Sicilian Buttercups	43	141
F. Leney	White Leghorns	84	141
H. Hammill, N.S.W.	Do.	85	130
E. F. Dennis	White Wyandottes	71	106
Moritz Bros., S.A.	White Leghorns	91	104
F. W. Leney	Rhode Island Reds	53	92
Totals	...	8.341	20,851

* Denotes engaged in single pen test.

RETURNS FROM SINGLE PEN TESTS.

Competitors.	A.	B.	C	D.	E.	F.	Total.
T. Fanning	83	90	84	84	72	57	470
J. Zahl	72	72	80	68	76	76	444
Mrs. Jobling	87	96	49	74	50	70	426
Miss Hinze	71	55	87	60	67	62	402
A. T. Coomber	76	79	68	53	59	67	402
Dixie Egg Plant	95	83	78	70	0	68	394
J. Manson	47	86	59	56	77	52	377
E. A. Smith	79	52	51	78	39	38	337
A. E. Walters	61	87	49	38	70	29	334
E. F. Dennis	54	77	30	69	56	44	330
J. F. Dalrymple	57	43	77	20	63	66	326
C. Knoblauch	59	48	38	44	56	58	303
J. Anderson	71	40	71	0	83	38	303
W. F. Forrest	52	58	38	67	54	34	303
Kelvin Poultry Farm	47	33	57	39	70	55	301
J. H. Gill	24	73	27	79	45	48	296
E. West	74	61	32	37	28	63	295
W. H. Knowles	55	34	51	29	50	51	270
J. H. Madrers	26	57	57	66	40	18	264
J. W. Macrae	9	68	58	29	30	37	231

The Orchard.

THE PECAN NUT.

Although the walnut and the pecan tree thrive well in the cool districts of Queensland, particularly on the Main Range, near Toowoomba, and bear profusely, very few people on the land have ever taken the trouble to plant them. Yet quantities of walnuts are regularly imported, and meet with ready sale. The reason for this apathy is nut-tree planting could easily be accounted for if it were a question of planting an orchard of such trees, waiting some years for a crop, and creating or finding a market for the produce. But there is no need to devote any large area of land to an exclusive plantation of nut-bearing trees. Large numbers of trees can be planted along the boundary fences of the land without in the least interfering with the production of the usual farm crops. They would be beneficial, irrespective of their fruit, as breakwinds, and eventually as furnishing a supply of mill-timber and firewood. Very little attention is needed in the case of walnuts, chestnuts, pecans, &c. They continue to grow whilst the farmer devotes his labour to the production of the usual crops, or to dairying, sugar-growing, &c.

How many years does it take the pecan to bear? Competent authorities in the United States of America are all in accord in assigning the limit of from five to ten years, but, singular to say, the age limit does not apply to the pecan as to most other fruit trees—size alone determines the period elapsing between planting and harvesting a first crop. Congeniality of soil and reasonable attention at the outset determine the size more than time, and bring about the bearing period. Whenever this size and height are attained, if only in five years, the young tree will bear; if not reached in 100 years, it will not bear. Hence the importance of promoting quick growth by every means possible in selecting the most congenial soil, and planting that which gives the best send off of nut or scion. The size of the tree in bearing often varies. Thus, no young tree is apt to bear until it reaches the height of 8 ft., and has a well-grown trunk and a heavy top, and every tree is apt to bear by the time, or before it attains 15 ft. in height, unless the trees are so crowded as to run up like scaffold poles.

The first fruits are very scant, two or three nuts to a handful on a tree. But after the tap-root strikes water or permanent moisture and congenial soil, the growth is very rapid, as well as the increase in bearing.

A convenient distance at which to plant the nuts is from 24 to 30 ft. We have mentioned the Main Range as a suitable locality for pecan growing. Some years ago (1901) Mr. H. L. Pentecost had 37 pecan trees. Some received proper attention and averaged at that time 9 ft. in height. In the year after that height was attained the trees bore, although Mr. Pentecost did not expect any fruit before they were 20 years old. Care has to be exercised in transplanting young trees, as it is necessary to dig down nearly 3 ft. to get to the bottom of the tap-roots before getting any fibrous roots. Professor E. N. Plant, Kansas, relates that, when engaged in making a botanical survey of the State of Kansas, he had frequent opportunities to study the peculiarities of the pecan tree, "that prince among the hickories, indeed, of American nut-bearing trees."

Kansas has most of the North American hickories.

The pecan is the most beautiful and symmetrical tree of the genus. Its range extends about 100 miles north from the southern boundary of the State, and 200 miles west from the line of Missouri.* Throughout that district it is abundant. Its favourite station is the rich bottom lands of our creeks and rivers.

There, individuals are found 2 or even 3 ft. in diameter, and rivalling in height the tallest of our forest trees. The pecan is very much disposed to come in and occupy the ground to the exclusion of other trees, where the original forest has been cut off. A second growth of hundreds of individuals of this species may be frequently seen growing along our watercourses. The tree grows rapidly. It bears young. It is generally healthy and free from the attacks of insects. It is worthy of far more general cultivation than it has yet received. The nut of this tree commands a high price in the markets. The demand for it that is likely to increase largely in the future will render its cultivation profitable. Few better investments of capital could be made, even in this favoured State, than in planting out orchards of pecan trees on our rich bottom lands.

TRAPPING THE FRUIT-FLY AND MOTHS.

Various suggestions have been made as to methods of destroying or trapping the fruit-fly. Here is one we have just come across—the following idea:—

Get a number of pieces of board and tin and paint them with luminous paint; then hang them in the fruit trees, and cover them with some sticky matter, such as honey or treacle. The flies, moths, &c., will be attracted, and will stick on the boards. When pretty well covered with insects, they can be washed or again painted.

SOCIETIES.

We must again draw the attention of Hon. Secretaries of Agricultural and other Societies to the frequent neglect of retiring or incoming secretaries to notify us of any change in the office. As an instance, we were just lately advised that a certain Association, which has had a place in our list to date, was defunct seven years ago.

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* That is, from 37° to 39° degrees north latitude and about 94° to 98° west longitude.

Horticulture.

WHEN AND HOW TO PRUNE ROSES.

In a very excellent article on "Planting and Pruning Roses," the "Garden and Field," Adelaide, points out that while the time for pruning roses is now approaching for South Australia, in New South Wales and Queensland the work is done much earlier than in the Southern State, the reason being chiefly that the warmer the climate, and, consequently, the earlier the spring, the sooner the roses must be prepared for it. In the Southern States pruning is generally later, and even in New South Wales, in the colder districts with their late springs, the pruning may be much later than in the warmer coastal parts.

"As a general rule, to prune very late means to get a fairly early bloom; and if it has been done severely, as some gardeners do, leaving not a leaf on the stems, the result is a brief period of very full bloom. This is not a good garden system, as it gives us only two or three crowded weeks of blossom, during which period the bushes are covered, and then leaves them incapable of putting forth any more effort until the autumn. The time for pruning, therefore, must be varied according to the particular districts and its seasons, and with a due regard for the desired result.

"HOW TO PRUNE.

"Perhaps a few rules for the guidance of the amateur pruner will be of value; and if the veteran should happen to glance over them, and find that the writer's ideas differ from his, he must be charitable, for in gardening, as in everything else, there are frequently two opinions, if not more.

"First of all, the old dry worn-out looking wood should be cut out. Sharp secateurs and a pruning knife for getting at the difficult places are required for this. Weakly looking shoots must also be cut out to give their better favoured fellows a chance. The shoots that are still young and immature at pruning time should also go, leaving only the well-developed and plump stems.

"As a general rule, the thorns are an indication of what to leave and what not to leave. The red thorns show the young undeveloped wood, the brown thorns are a sign of vigorous prime, and the sparse dead thorns are an indication of worn out stems. The work outlined, however, is only getting ready for pruning, as almost anyone can tell what should be cut away as useless. The real toil comes into play after this part of the work has been completed.

"PRUNING FOR BLOOMS.

"Having decided what stems are to be left, the next work is to trim these so that they will give the best possible results in the matter of bloom. Unpruned roses bloom, it is true, and often for several seasons, notwithstanding our neglect, but the flowers become smaller and poorer each time, and appear in a straggling way without much regard for season. Judicious pruning brings the best qualities of the rose into play and results in the production of buds at a time and in a manner that will give them the best possible chance of developing into fine flowers.

"The same rules do not apply to all kinds of roses alike, as some run to a free woody growth far more than others, and this exuberant growth must be checked.

"In cutting short a stem, the cutting is done as cleanly and sharply as possible, just above a bud. Always remember that the buds that point outward have the best chance of developing well. The buds referred to, of course, are the little shoots just showing out, not the flower buds. If the gardener is pruning to obtain a few special blooms, as for exhibition, very few of these buds are left, but for general purposes a much larger number are allowed to mature.

"Stems that have borne freely in the previous year may have worn themselves out, and, though large and well grown, they should be removed in favour of newer growth. A certain amount of care is needed also to shape the bush, not too severely, yet neatly. If the plants are young ones, they should not be checked too severely, but should be given a chance to form a certain amount of wood, before anything is done to bring out their blooming qualities.

"In planting roses in lawns or other situations other than in prepared beds, the holes should be dug at least three days before the planting is done. The holes should be dug about 2 feet deep and 18 inches in diameter. Make a mound of made-up soil at the bottom of the hole (in the shape of a cup or a basin turned upside down), so that the roots will train down the sides and be spread out to obtain all the sustenance within reach. Then cover in, water, and tread firmly."

MANURE FOR ROSES.

A good manure for roses is stated by the English National Rose Society to be:—"Basic slag, which contains lime and phosphorus, may with advantage be used in the proportion of 3 oz. to 4 oz. per square yard, whilst nitrogen may be afforded by a dressing of dried blood or fish guano, followed by applications of nitrate of soda. A good general manure for roses consists of two parts of dissolved Peruvian guano containing 8 per cent. of ammonia, one part bone meal, half-part sulphate of potash, one part of dried blood, half-part nitrate of soda. The whole should be well mixed, and applied in early spring at the rate of 5 oz. per square yard."

Tropical Industries.

COMMERCIAL CANE SUGAR IN SUGAR-CANE.

By J. C. BRÜNNICH, Agricultural Chemist.

A payment for sugar-cane based on analysis has always been considered the fairest method from both farmers' and manufacturers' point of view; the utilisation of the analytical figures for the calculation of the monetary value of a sample of cane, however, is not so easy as it appears on first view.

To estimate the value of cane either from the density of the juice (° Brix or Beaumé), or from the amount of sucrose or cane sugar in the juice alone, is obviously out of question, and it has therefore become customary to calculate from the analysis of the juice the amount of sugar in the cane, which is sought to be obtained during manufacture, after taking into account various interfering factors, and which may be called "available sugar," "Pure obtainable cane sugar," or "Commercial cane sugar" of the cane.

A large number of factors have an influence in the recovery of the sugar from the cane in the course of manufacture, and it is quite impossible to establish a mathematical formula which could take all the factors into account, and therefore no formula of commercial cane sugar can express the absolute value of a sugar-cane to the miller.

We may have two samples of cane with absolutely identical values of commercial cane sugar and containing even the same amount of fibre, and still the actual value of the canes, as found by practical experience in the mill, from the yield of sugar in the bags, may be very different. Not only the total amount of fibre in the cane, which by itself is easily taken into calculation, but the arrangement or rather distribution of the fibre in the structure of the cane stalk is of utmost importance to the miller, but cannot be allowed for in any simple formula.

The stalk itself is made of joints, of various length and thickness, separated by much harder nodes, to which the buds or eyes are attached. The stalk itself consists, broadly speaking, of three parts: a hard outer rind and a mass of soft tissue, which is interspersed with numerous bundles of harder fibre. In the cells of the soft tissue, or parenchyma, the sugar is stored up, whereas the fibres or fibro-vascular bundles transmit water and all food materials from the roots to the leaves, and assimilated products from the leaves back to the stalk. In each variety of cane the size, shape, and arrangement of these fibre bundles vary, and not only the actual crushing quality of the cane variety, but also the extraction of the sugar and impurities, due to easier or more difficult diffusion of the maceration water into the cells, must depend on the structure of the cane stalk.

The impurities in the cane juice, roughly indicated by the difference between the total amount of soluble solids in the cane juice (° Brix) and the amount of sucrose, have an important bearing on the manufacture and recovery of sugar. Only part of these impurities can be removed in the course of manufacture, and the part remaining contributes largely to the production of molasses in preventing certain amounts of the sugar to crystallise. A great number of chemical compounds make up the non-sugars of the cane juice, and all act differently, and an ideal formula of commercial cane sugar should take at least each of the most important compounds into calculation. This is, of course, quite unpractical, as no complete analysis of every cane juice could possibly be made.

The impurities or non-sugars in the juices of certain cane varieties are often fairly constant and characteristic, and therefore differentiate the milling quality of the numerous cane varieties, so that the same amount of commercial cane sugar (C.C.S.) in two varieties of cane may not have the same value to the miller.

A formula for C.C.S. can make no difference between unripe, ripe and over-ripe cane, but the difference in the working of juices is well known to every manufacturer, and more particularly the high density juices of over-ripe cane, with a comparatively high amount of C.C.S., yield generally very viscous and refractory juices, and are therefore of much less value than a juice of a normal healthy cane which may actually contain a smaller amount of C.C.S.

Season, locality, and variety of cane should therefore be taken into account in the calculation of the C.C.S. of a cane, and as this is not possible, allowance should be made when translating the value of C.C.S. into monetary value or fixing of prices.

The analysis of burnt cane is frequently very misleading in fixing its value. A cane freshly burnt will often show an increase in the percentage of sucrose by ordinary analysis, but still the recovery of the sugar in the mill is seriously diminished when treating large quantities of burnt cane. Here, again, the formula of the C.C.S. is at fault, and for this reason a justified but quite arbitrary deduction in the price is generally made. The apparent increase of sucrose is sometimes due to loss of moisture during burning, but is frequently due to dextro-rotary bodies formed, the presence of which is detected by determining the sucrose after Clerget's method. But even if the composition of burnt cane is apparently normal, due to the more or less severe heating of the juice in the cane, some subtle change has taken place which places the sugar into a kind of unstable condition, so that during crushing, maceration, and clarifying, inversion of the sugar proceeds much more rapidly than in normal cane juice.

For the purpose of the calculation of the commercial cane sugar in cane, laid down by regulation under "*The Regulation of Sugar Cane Prices Act of* 1915," in the front roller juice the amounts of total soluble solids (° Brix) and the cane sugar or sucrose are determined, and in the sample of cane the amount of fibre has to be determined. The analysis of the juice is a comparatively simple matter, but the determination of fibre is rather difficult, as it is not easy to get a true average sample of canes from the trucks and to disintegrade the sample into a fine pulp suitable for analysis. The total soluble solids in the cane are calculated as follows:—

$$\text{Total soluble solids in cane} = \text{Total soluble solids in juice} \times \frac{100-(3+\text{fibre})}{100}$$

and

$$\text{Sucrose in cane} = \text{sucrose in juice} \times \frac{100-(5+\text{fibre})}{100}.$$

The difference in the calculation of the two constituents is due to the fact that the slight extraction between front roller and top roller of the first mill yields a purer juice than actually existing in the cane.

The impurities in the cane are the difference between the total soluble solids and sucrose in the cane, and for the calculation of the C.C.S. half of these impurities are deducted from the sucrose in the cane, so that we have the following formula:—

$$\text{C.C.S. in cane} = S\,\frac{100-(5+F)}{100} - \frac{B\,\frac{100-(3+F)}{100} - S\,\frac{100-(5+F)}{100}}{2}$$

or simplified for calculation—

$$\text{C.C.S.} = 1\tfrac{1}{2} \times \frac{S\,(95-F) - \frac{B}{3}\,(97-F)}{100}$$

A difficulty in the determination of C.C.S. arises in those mills where part of the juice is expressed by special crushing rollers before the cane enters the mill, in which case neither the juice from the crushing rollers nor the juice from the front roller could be used by itself directly for analysis, and special instructions will have to be made for each individual case.

THE BRITISH NEW GUINEA DEVELOPMENT COMPANY'S ANNUAL REPORT.

In the year 1911, the pioneers of the company visited Port Moresby with the object of taking over certain lands in different parts of the territory. The representatives of the company were Messrs. C. Darling, South Australia, Mr. C. Jenkins, who was previously Premier of South Australia, Mr. John Macdonald, Superintendent of Public Works, and the writer, Editor of the "Queensland Agricultural Journal." These gentlemen, whom it was our privilege to accompany in the capacity of adviser as to the acceptance of land selections offered to them in various districts of Papua, both on the coast and inland as far as Sogeri, and on the coast, in Cloudy Bay and the Baubaguina River, Galley Beach and the Brown River, made an exhaustive examination of all the properties offered to them. In that year, nearly the whole of these properties were still in their pristine state of dense standing scrub. Passing over the years intervening between the date of the first landing at Port Moresby, we to-day publish the latest annual report of the company who, by the way, are deeply indebted to Mr. John Macdonald, the present Superintendent of Public Works, to whose long, intimate knowledge of the native question in the State is to be attributed the present favourable position of the company.

The final call of 2s. per share on the 7 per cent. participating preference shares has now been made, and from our advices from authentic sources in Papua we conclude that the British New Guinea Development Company is in a very thriving position, both as regards rubber, tobacco, and general trade.

The writer remembers the many difficulties under which the above-named explorers worked in the preliminary investigations. On one occasion, the members travelled on foot during heavy rains from Port Moresby to Sogeri, about 35 miles, and returned on the next day to Port Moresby.

The result of the explorations by sea, river, and land has been an unexampled success, and the results to date here follow:—

The British New Guinea Development Company, Limited, has found it necessary to make a final call of 2s. per share on the 7 per cent. participating preference shares. The general manager estimates the production of copra for the year ending 31st January, 1917, at 78 tons. The first shipment of 4,000 lb. of rubber recently arrived in London, and smoked sheet realised 3s. 5½d. per lb. The output of rubber for the current year is estimated at 26,880 lb. The preliminary report states that the Australian Government has done a good deal of survey work in the Papua oil district, and it is hoped that permission will ultimately be obtained to proceed with the development of the oil lands originally discovered by this company's representatives. Trading continues to be an important part of the undertaking. The general manager estimates the profit for this year, including tobacco, at £10,000, and next year £12,000, subject to war conditions. Apart from the plantations, the company has various assets, consisting of town property, ships, plant and machinery, live stock, stores and produce on hand to the estimated value of over £100,000. In the directors' opinion, the cash resources will be sufficient to bring the plantations to maturity.

A surveyor has measured the plantations, and the actual surveyed areas will probably be: Cocoanuts, 5,000 acres, rubber, 1,000 acres; sisal hemp, 1,000 acres. Copra for the year ending 31st January, 1917, is estimated at 78 tons only, but should rapidly increase. In 1918 there should be about 1,400 acres in bearing, and in 1919 about 2,500 acres. At a conservative estimate, copra from mature trees should be half a ton per acre. Para rubber trees ready for tapping in December last totalled 15,761. The general manager estimates 26,880 lb. this year, and 89,600 lb. next year. Sisal hemp this year is estimated at 120 tons. There are 7,000 acres of planted land, and there are 48,000 acres of selected land still available.

A NEW FIBRE AVAILABLE IN CUBA.

The article below is from the "Textile Mercury" of 29th April:—

There are eleven known varieties of the so-called "malva" in Cuba, but that locally designated as "malva blanca" (*Urena lobata*) has been determined to be a very promising source of fibre, from which may eventually be woven the supply of sugar sacks for the Cuban market, while the finer varieties can undoubtedly be used in the manufacture of new fabrics for wearing apparel.

According to Mr. Garrard Harris, the United States special agent there, experiments have been conducted in Cuba for several years, with the idea of utilising the malva fibres, but only in the last two years have the processes of extraction been elaborated on a basis that makes the extraction a commercial possibility. Malva fibre is now being manufactured and sold on the market at Habana, principally to the makers of alpargatas, or cloth shoes, worn by the labouring classes. The fibre is mixed with jute and used for soles. The persons producing it claim that they can profitably produce and ship it for less than 1½d. per lb. with present crude methods, and that the cost would be considerably reduced with proper labour-saving machinery and equipment. It is, however, as the fibre from which to make the 20,000,000 sugar sacks needed in Cuba annually that the owners of the process have the greatest hope for it. They assert that sacks of malva of 2½ lb. each can be placed on the market at 3½d. to 5d. each and still leave a profit, and at current prices for jute sacks the profit would be larger. Normally, the Calcutta or Dundee sacks sell, delivered in Habana, at 8d. to 9d. each, and in war times have been selling at considerably higher prices. The malva fibre is claimed to have about the same textile strength as Dacca jute, and its fineness is between jute and flax. It is believed that by seed selection and cultivation the fibre can be improved in both strength and quality. Sufficient results have already been achieved to demonstrate that the cultivated plant responds to good treatment, and comparisons with the wild plant show a better fibre from cultivated plants only one year removed from the wild seed. Seed is now being obtained from selected plants with a view to further tests.

Malva blanca is generally regarded as a troublesome weed by the tobacco planters of Pinar del Rio, where it grows best. In its wild state it attains a height of 20 ft. under favourable conditions, but usually averages between 6 and 10 ft. on ordinary soil. During the growing season, it is claimed, it will make two crops of 6 to 10 ft. where it is cultivated, and, according to the method of planting it, will produce a stalk ½ in. to 1½ in. in diameter. From the bark on this stalk the fibre is obtained. The plant requires a good soil. It grows wild under ordinary conditions, and the more rain and moisture it gets the better the growth. Wind-storms do not injure it, and it is thoroughly hardy in the Cuban climate. To cultivate it the ground is ploughed and seeds are sown from March until May. The ground is thoroughly harrowed, and the rows are put four to the yard. About 1,200 lb. of seed is required to sow a caballeria (33⅓ acres). The young plants are thinned until they stand on an average of 44 to the square yard. By planting thickly and growing in this manner the tendency to throw out lateral branches is checked; the growth is forced upward, thus making a long, clear stalk; the leaves and branches grow on top of a tall switch, so to speak. After thinning out, intercultivation would probably be necessary to prevent growth of weeds.

In three and a-half months, when the plants have reached a height of from 6 to 8 ft., cutting is commenced, this being the best age at which to harvest. It is claimed that two cuttings may be made in a year without the necessity of replanting, new sprouts being thrown up from the stumps left in the ground. The present method of cutting is by hand, the men using "machetes," or cane knives, and striking a downward blow at the root. This frequently cuts below the buds and destroys the ability of the plant to throw out other stalks, thus curtailing the second crop. It is purposed to use on the next crop a corn cutter and binder, not only to reduce expenses of gathering, but for the protection of the roots. Modifications in the cutter and binder will probably be necessary to adapt it to the harvesting of this fibre. Cutting may be continued until the end of November. In December the plant normally begins to put on seed, and the fibre is more difficult to work then.

Plants cut after a three or three and a-half months' growth show only one layer of fibre. Old plants that are allowed to go to seed without having been cut, it is claimed, show as many as eight layers of varying degrees of fineness, thickness, and strength; but it is difficult to extract them separately. For commercial purposes the three or three and a-half months' growth has been found best as a result of continued experimentation.

At the experimental grounds several miles from the town of Vinales, in the province of Pinar del Rio, Cuba, two methods of handling malva have been evolved. Both require the use of water. The cost of cutting under the present hand methods is about 12s. 6d. per 10,000 green stalks, or the labour of three men at 4s. 2d. each per day. The average amount cut by three men equals the above figure. They work with "machetes" or cane knives. The stalks are loaded upon wagons and taken to the "retting tank," or steeping pond. A wagon can carry only 100 arrobas of 25 lb. each at a load, and 4s. 2d. for each load is charged. It is purposed to use a movable bark-stripping machine, gasoline power, which will handle the crop as it is cut and piled by the harvester. The 2,500 lb. of stalk would yield 20 arrobas (500 lb.) of bark; of this bark, 5 arrobas (125 lb.) would be fibre. As much as 200 arrobas of bark could be piled on a wagon at one load, so that the initial cost of transportation from fields to processing vats could be reduced to about one-tenth of what it now is. Moreover, fewer men would be required than where the brush only is handled. Possibly other economies in this line could be effected under adequately capitalised business. The experimenters claim to have devised and patented an economical bark stripper.

The stalks or the bark is placed in the rectangular wooden "retting pond," which is about 25 by 60 ft. and 4 ft. deep. The crude product is then weighted down in a solution of weak sulphur water, to which a small quantity of potash has been added. The potash hastens the elimination of mucilaginous matter in the stalks, adds whiteness to the fibre, and does not injure either strength or texture, so it is claimed. The bark or stalks remain in the solution from 6 to 40 days, depending upon the temperature. The higher the temperature the more rapidly the process is completed. Steam pipes in the tank, it is asserted, would hasten the chemical action, make the results certain. and enable the workers to be independent of climatic conditions.

The other method is simply to place the stalks or bark in one of the running sulphur streams in the Vinales district. The fibre from the stream is much whiter than that from the pond or tank. Possibly the sulphur water has a bleaching effect, and, on the other hand, it is very likely that being in clear running water instead of the stagnant and none too clean water in the "retting pond" has something to do with this feature. On taking the bark, or stalks, from stream or retting pond, when examination has disclosed that it is ready to be worked, the process is slightly different for each method of treatment. The bark from the retting pool is then hung in the air and sun, and atmospheric action loosens the remaining particles of mucilage and bark, which are largely removed by vigorous shaking. On the other hand, the stalks removed from the sulphur streams have to be dried out. Women strip off the loosened fibre and tie it in "hands," or small bundles. The fibre is then ready for shipment, and is packed in open, rope-bound bales of about 400 lb. each.

A RAPIDLY VULCANISING RUBBER.

WARNING TO RUBBER PLANTERS.

The Rubber Growers' Association, London, 12th April, 1916, draws the special attention of members to the following report by the association's consulting chemist:—

In a recent issue of the "Agricultural Bulletin of the Federated Malay States" (Vol. IV., No. 2, of November, 1915, p. 30), there appears an article by one of the staff, entitled "Preliminary note on a new rapidly vulcanising rubber." This article deals with experiments in which the coagulated rubber is treated with caustic soda, sodium carbonate or lime. It is stated that the rubber so treated cures rapidly, and the writer concludes, "It is possible that a rubber of this type may be of considerable value commercially, in view of the remarkably rapid rate at which it vulcanises."

It is, however, a known fact that even small quantities of alkalies or lime have a profound effect on the vulcanisation of rubber, and the North British Rubber Company have addressed a letter to your association to this effect. They state that the use of alkali might result disastrously for those planters who might adopt it, on account of the changes which ensue in a short period of time in the vulcanised samples to which alkali has been added. They state that, sooner or later, perishing almost invariably sets in, and, in fact, the whole practice is an extremely dangerous one. The North British Rubber Company fear that the publicity of the bulletin amongst planters and the remarks at the end of the paper that the addition of alkali may give a type of rubber of considerable commercial value might prompt certain planters to adopt the use of alkali on their estates, and that this at a later date would come home to them to their discredit.

Members of the association who have subscribed to the research fund will already have been informed of the danger of treating rubber with caustic soda. A reference to the 17th Malaya Report, p. 13, will show that we stated that manufacturers would certainly take objection to rubber in the preparation of which caustic soda and lime were employed. Further tests we have made prove the deterioration referred to by the North British Rubber Company, and details of these tests will be published in our report to the association. Members are therefore advised on no account to treat their rubber with caustic soda or other strongly alkaline substances.—"Clayton Beadle and Stevens."

QUEENSLAND SUGAR CROP—SECOND ESTIMATE.

Since the last approximate estimate of the 1916 sugar crop was published in March last, Mr. Easterby, General Superintendent of Sugar Experiment Stations, states that conditions have improved to some extent, and it is now probable that about 186,000 tons of sugar will be manufactured, providing all conditions remain favourable. This output, at the price of £18 for raw sugar, will be worth some £3,348,000, and, apart from this value, it shows the enormous benefit of the sugar industry as a means of retaining wealth in the country, for, as recently pointed out by the president of the Australian Sugar Producers' Association, the importation of the above amount of sugar would mean many millions of pounds being sent to other countries which take little or nothing in return from us.

A NEW HYBRID YELLOW WHEAT.

A new wheat, named "Ceres," has been obtained by crossing Yellow Briquet with Autumn Victoria in the experiment fields of Messrs. Denaiffe at Carignam. Having been grown for some ten years under very variable conditions of soil and climate, it has always shown great constancy together with strong constitution; it is perfectly hardy, and has remarkable rust resistance. This hybrid is, in nearly every point, clearly intermediate between its two parents; it is semi-late, tillers well, producing fairly long and firm straw, quite white when ripe.

Its characteristics are as follows:—Ears white, rather elongated, semi-compact, not tapering at the summit; spikelets arranged somewhat in the form of a fan with short, much inflated glumes, completely filled by the grain, which is medium-sized, short and very full, and bright yellow in colour.

This wheat, while giving a heavy crop of straw and grain, and extremely regular in its growth, is not exacting, and suits all moderately fertile soils. The great strength of its straw also allows of its being grown on rich soils. Ceres seems from its pedigree and parentage likely to be one of the varieties that are really resistant to straw blight.—"Bull. Int. Inst. of Agric."

Viticulture.

WINE GROWERS' CO-OPERATIVE WINE CELLARS.

BY C. A. GATTINO, Charleville.

Owing to the poor conditions of the wine market here in Australia, it is absolutely necessary for all wine grape growers to devise some action to prevent the falling off of this great agricultural industry.

The excellence of the produce, its uniformity, the qualities corresponding with the wants of a certain market, the right and honest advertising, are the means that can and must bring about the increase of the wine consumption.

If not all, certainly most of these means could be brought into action by a Wine Growers' Co-operative Cellar, and they could then all be effectuated by a union of these co-operatives.

These cellars would seem something new for the Australian farmer, but they are really not a novelty, and must not be considered so new as to prevent their acceptance.

Although the association's principle here is strongly felt in political matters, it is not yet well accepted in the economical sense. The good farmer generally thinks: "How should I associate myself with others who do not hold soils, fields, or crops as good as mine? Why should I bring them profits that would, perhaps, result to my disadvantage?" "Every one for himself and God for all." That is their argument.

And so, not being able to apply the progress of the science, to know how and where to place the produce to better advantage, the slowly developing agriculture will always be exposed to suffer the slightest economical adversity of the markets and never ready to take advantage of the favourable periods.

All this is the result of not recognising the great principle that "Union makes strength."

These cellars are the right co-operatives of production, as they constitute a first material property of the associates.

It is not necessary for a number of farmers to form the co-operative. I think, instead, that the cellar should start by working the produce of a few only, as an easier beginning. The other farmers would join after recognising its usefulness, and the increase of production would then bring the maximum advantages and afford a better chance of applying all Oenology's dictates.

As you see, the co-operative wine cellars are particularly made for small proprietors of vineyards. These small farmers are the ones that, in years of good harvest, fill the market with cheap grapes and generally make wines that cannot be classified and which are difficult to market except by local merchants.

It is, therefore, specially for them that the cellars are useful; but it is not from them that we have to expect the constitution.

Amongst all land proprietors they take better care of their farms, but they are certainly not the most learned or the most capable of taking the initiative.

Others, then, should willingly put their work and activity and knowledge into forming such co-operatives.

The purposes of the co-operative wine cellars will essentially be the following:—

(1) To obtain wines of constant type.

(2) To save all possible in the expenses of production.

(3) To gain a reputation for a certain district or State.

(4) To facilitate the trade of the produce through suitable advertising.

(5) To give to the members of the association means of getting advances on their crops, thus preventing the necessity for making forced sales.

(6) To be enabled, by an understanding with the other wine cellars, to sustain the prices of the wines.

Each of the abovementioned purposes needs some words of explanation.

First, with the co-operative cellars we can obtain produce of constant type; and, in fact, as you well know, in working different qualities of grapes, it is easy to compensate or destroy, by manipulation, the good qualities or the faults, and it is also possible for the technical person managing the cellars to introduce to the raw material all the modifications that his knowledge and judgment think opportune.

There are still people who do not believe in the importance of the uniformity in type; this is only because they often see some buyers going to their cellar wishing one quality, and some others wanting another. This, however, is caused partly by the buyer's lack of commercial tact, and partly by the grower's inability to make wines such as are required.

The wine merchants often, not being able to find what they want, have to make the wines required by their trade, and, for the sake of saving a few pence per gallon, do not always buy the produce of the same vineyard, and not even the one of their own State.

If the wine merchants knew the harm they succeed in bringing to the growers and also to themselves, they would certainly look for a more proper method of trading, and if the wine merchants would be more faithful, they could obtain better prices and consistency in quality.

Therefore, the co-operative cellars, being able to prepare wines as required by the consumers of a certain district or State, and to approach the wine merchants better than a single grower, will assist in the development of the wine industry and bring it to a firmer and more flourishing condition.

With these co-operatives the cost of production would be cheaper; in working at the same time the grapes of several proprietors some of the labour and material expense would be proportionately reduced.

It would bring reputation to the produce of the district or State, because every one would know that in a co-operative cellar, where the technical direction is in the hands of a competent man, there will be applied all enological means to produce good wines, only, however, in the proportions allowed by the numbers and the financial strength of the cellar itself.

The advertising that a wine-grower can make for his own wines, especially if a small proprietor, will always give a minimum result and hardly would touch more than his nearest market. A co-operative cellar, with a smaller expense to each associate, can reach more distant markets and obtain what the wine-growers cannot get for themselves.

None of the small wine-growers can make known his wines in all the markets of our State or other States.

Another of the most economical results which can be realised through the co-operative cellars for the benefit of a certain district and of the small proprietors is represented by the advances on the value of the produce.

In opening a bank account for the members of the association, the latter could, draw by endorsement of the co-operative, the amounts they require for their cultivations at a low rate of interest, thus saving them from the hands of usurers.

The cellars could also issue warrants and make them circulate in the district instead of money; this, of course, when the wine-growers co-operative will have acquired the solidity and the credit that could not fail, if established and managed with proper method and honesty. Another useful advantage would be that these cellars could organise the institution of wine shops selling direct to the consumer, increasing the consumption of wine, by supplying at cheaper prices good, hygienic, pure juice of grapes, eliminating the profits and the handling by middle speculators.

All the abovementioned advantages should stimulate, in a grape farming district, the institution of one of these co-operative cellars, and very probably the Government would encourage these useful institutions by way of formation subsidies, for the interest and the development of this great agricultural industry and the economical benefit of the State.

[We shall be pleased to receive any correspondence bearing on the above subject.—Ed. "Q.A.J."]

Entomology.

GRUB PEST OF SUGAR CANE.—REMEDIAL MEASURES SUGGESTED.

The Bureau of Sugar Experiment Stations has just issued a Bulletin (No. 4 of the Division of Entomology), "The Value of Poison Bait for Controlling Cane Grubs," by Mr. Edmund Jarvis, Acting Entomologist to the Bureau at Gordonvale, near Cairns.

"Any method likely to be successful in coping with the most serious pest sugar-cane has to contend with is of the most urgent importance," states the General Superintendent, hence the early publication of this Bulletin, which deals with experiments on a laboratory scale only. The means advised of destroying grubs is by planting cowpea on each side of the rows of young cane, dusting over with arsenical poisons and then ploughing this bait under against the roots of the cane. The cost per acre is reasonable and the work can be expeditiously carried out. As thousands of pounds worth of damage is yearly done by grubs in North Queensland, farmers are asked to adopt the methods on fields where grubs are prevalent in those cases where cane will be planted in August and September next. Mr. Jarvis states that the proper time to sow the cowpea would be about three weeks after the first general appearance of the Greyback beetles, as the soil would then be disturbed after oviposition and probably many egg chambers would be broken. The emergence of beetles generally takes place at the end of the year. Copies of the Bulletin are being sent to all cane farmers' associations in Queensland, but any farmer unable to obtain a copy may secure one by applying to the General Superintendent of the Bureau of Sugar Experiment Stations.

CONTROL OF INSECT ENEMIES OF THE SUGAR-CANE.

By E. JARVIS, Entomologist.

The following report has been received from the Entomologist of the Bureau of Sugar Experiment Stations by the General Superintendent:—

The past month has been devoted mainly to the study of two phases of natural control affecting the economy of certain insect enemies of cane, viz.:—(1) Meteorological conditions, with relation to their influence on the distribution and numerical increase of cane-beetles; and (2) predaceous insects, with special reference to a species presumed to be predatory on some of our minor pests of cane.

Field investigations regarding the latter form of control have led to the discovery of a most beneficial orthopterous insect that is evidently an inveterate foe of the sugar-cane plant-louse (*Aphis sacchari* L.).

This interesting species is none other than a small arboreal earwig that has attracted considerable notice in these parts, owing to its habit of flying very plentifully around acetylene lights, &c., on warm evenings, and often crawling over one's face.

It was mentioned in a previous monthly report ("Australian Sugar Journal," vol. VII., p. 449) as being possibly predaceous and having been observed on light-traps used for catching cockchafers.

The adult insect—which varies in length from one-half to five-eighths of an inch—is of a general dark reddish-brown colour, with thorax, tegmina, and legs light yellow, and a conspicuous brown stripe down the centre of wing-covers. Its body is polished in appearance, and the anal cerci or forceps of the male are longer and more slender than those of the opposite sex, and much widened at the base internally in the form of an obtuse triangle.

This pretty earwig is most likely a species of the genus Labia, but seems, up to the present, to have escaped the notice of systematists, as specimens submitted to the Australian Museum in 1915 were returned to me unnamed.

Although excessively abundant throughout forest country, it habitually frequents canefields in the vicinity of Gordonvale, where numbers may be met with at all times of the year, either crawling over the foliage of stools or hiding behind withered leaf-sheaths and between the young unfolding leaves.

Whilst studying our bud-moth of sugar-cane in 1915, I found that its larvæ during confinement were devoured by this earwig, but results then obtained were not conclusive, as no experiments were carried out under natural conditions.

The following evidence, however, resulting from both laboratory and field tests, affords substantial proof as to its carniverous tastes and great fondness for aphides.

When confined separately in large test tubes containing a portion of cane leaf infested with plant-lice, four of these earwigs consumed between them 120 specimens in seven hours—an average of about seventeen per hour.

Upon being introduced into the cages they pounced without loss of time on the defenceless prey, seizing an aphis with their sharp mandibles and holding the succulent morsel aloft while engaged in chewing it.

Each capture was generally followed by a quick backward movement of a few paces, the insect then standing motionless until ready for another mouthful.

It was amusing to watch these operations with the help of a powerful reading-glass, and observe how little colonies of aphides scattered in consternation as the enemy walked into their midst and started to snap them up one after another with relentless indifference. The first victims were usually vivaparous females of the wingless class; but larvæ, nymphs, and winged adults were also eaten with equal relish. The time occupied in devouring individual specimens varied from fifteen to twenty seconds. An earwig was next allowed to run up the leaf of a large growing cane plant on which aphides had been established and were breeding, its preliminary movements being closely studied with a magnifying glass.

In about a minute after release, having travelled ten or twelve inches, it encountered an assemblage of plant-lice and at once started to clear them off, eating a dozen or more with scarcely a pause, and in a manner that left little room for doubt regarding the nature of one of its favourite foods under natural conditions.

When examined four days later the foliage of this plant was perfectly clean, and not an aphis could be found.

As far as I am aware, the only earwig hitherto known to science as being to some extent carnivorous is a common European species, which, however, like most members of the family Forficulidæ, is a general feeder, subsisting chiefly on fruit and miscellaneous vegetable matter.

The occurrence in Queensland of an additional predatory earwig of decided economic value should prove a matter of interest to sugar-planters generally, both here and in such countries as Porto Rico and Hawaii, where Aphis sacchari occasionally causes noticeable damage to cane crops.

In all probability we are largely indebted to the insect now brought under notice for the efficient control of our plant-lice, which being always more or less in evidence at Gordonvale, would, if unchecked, multiply to an alarming degree.

THE OUTLOOK FOR COTTON.

"Cotton and Cotton Oil News," Dollar, Texas, U.S.A., 12th June, writes thus hopefully on the position of the cotton market after the war:—

"If the boll weevils destroy as much of this year's cotton as they did last year, the remnant that escapes the weevil will not adequately supply the world's demands, even if the war should continue, and should the war cease this fall (autumn) the price of the staple will go 'sky-rocketing.' The prudent farmer, however, will be prepared for either contingency by growing his own food and food supplies. The farmer who does this, year in and year out, loses no sleep over the ravages of the weevil, or over wars and rumours of war. His ways are ways of pleasantness, and all his paths are peace."

General Notes.

A NEW TANNING PROCESS.

A new rapid tanning process, which has been patented in France by M. J. Boilley, is described by the "Leather Manufacturer." It consists essentially in subjecting the skins to the preliminary action of a special mordant, with the object of fixing the tanning substances in the fibres of the skins more rapidly and permanently. The process can be applied either to the so-called "rapid tanning" or to slow tanning—that is, by the use of barks or extracts. This mordanting action is practised on skins that have been previously unhaired and delimed, and is obtained by the action of different mordants used in dyeing, such as alum, certain salts of iron or aluminium, &c., but also frequently with acetate of aluminium diluted in an equal weight of water, and free, as far as possible, from sulphuric acid, salts of iron, and pyroligneous substances that might discolour the leather.

The skins are immersed in this bath and allowed to remain from twenty-eight to forty-eight hours, so as to become thoroughly impregnated with the mordant, and prepared to retain the tanning substances employed later.

After the above bath the skins are taken out and allowed to drain off, and are then placed in a tan liquor composed of water and tanning extracts, in the same proportions as used for the rapid tanning process. They are left in this liquor for eight or ten days, until tanning is complete, after which they are removed and again set to drain off, when they are dried as usual.

In case it is desired to change the rapid tannage for the slow process, the skins are treated in the pits in the usual way.

Owing to the mordanting action they have undergone, the skins swell and absorb the tanning matter rapidly through all their substance. On the other hand, as this matter is not held in suspension in the skins as in present methods of rapid tanning, but are thoroughly fixed in the fibres, subsequent washing removes only the excess of tanning material used, without touching those that have been assimilated with the fibres.

To effect properly the fixing of the tannin, the skins should be frequently suspended and the liquor kept in a constant slow rotary movement, but not violently agitated, which would have the effect of injuring the skins. For this purpose a suction pump is used in the lower part of the tank and the liquor is discharged at the top.

The above process is applicable to all kinds of skins, varying the time of immersion according to their nature, thickness, &c.—"Leather Trades' Review."

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR AUGUST, 1916.

Article.		AUGUST.
		Prices.
Bacon	lb.	9d. to 11d.
Barley	bush.	...
Bran	ton	£7
Broom Millet	"	£18 to £25
Butter	cwt.	140s.
Chaff, Mixed	ton	£5 5s.
Chaff, Oaten	"	£5 to £5 10s.
Chaff, Lucerne	"	£4 10s. to £6 10s.
Chaff, Wheaten	"	£3 15s.
Cheese	lb.	9½d to 10d.
Flour	ton	£12 5s.
Hams	lb.	1s. 3d. to 1s. 4d.
Hay, Oaten	ton	£7 7s. to £7 10s.
Hay, Lucerne	"	£3 10s. to £4 10s.
Honey	lb.	6d.
Maize	bush.	3s. 5d. to 4s.
Oats	"	3s. 6d. to 4s.
Onions	ton	£5 15s. to £6 6s.
Peanuts	lb.	3d. to 4d.
Pollard	ton	£5 15s.
Potatoes	"	£10 10s. to £12
Potatoes (Sweet)	cwt.	3s. to 4s. 6d.
Pumpkins (Cattle)	ton	£1 15s.
Eggs	doz.	8d. to 11d.
Fowls	pair	5s. 6d. to 7s. 6d.
Ducks, English	"	4s. to 6s.
Ducks, Muscovy	"	5s. to 8s.
Geese	"	10s.
Turkeys (Hens)	"	10s. to 13s.
Turkeys (Gobblers)	"	15s. to 22s.
Wheat	bush.	5s. to 5s. 3d.

VEGETABLES—TURBOT STREET MARKETS.

Cabbages, per dozen	1s. to 3s.
Beans, per sugar bag	3s. 6d. to 7s.
Beetroot, per dozen bunches	9d. to 1s.
Carrots, per dozen bunches	9d. to 1s.
Cauliflowers, per dozen	6s. to 12s. 6d.
Chocos, per quarter-case	1s. 6d. to 1s. 9d.
Celery, per bundle	1s. 3d. to 1s. 9d.
Custard Marrows, per dozen	3s.
Vegetable Marrows, per dozen	3s.
Lettuce, per dozen	4d. to 9d.
Peas, per sugar bag	3s. to 8s.
Sweet Potatoes, per sugar bag	1s. 6d. to 1s. 9d.
Table Pumpkins, per cwt.	1s. to 1s. 9d.
Tomatoes, per quarter-case	1s. to 4s.
Turnips, per dozen bunches	4d. to 6d.
Rhubarb, per dozen bundles	8d. to 1s.

SOUTHERN FRUIT MARKETS.

Article.	JULY.
	Prices.
Bananas (Queensland), per case	7s. to 9s.
Bananas (Fiji), per case	13s. to 14s.
Bananas (G.M.), per case	10s. to 16s.
Custard Apples, per tray	4s. to 6s.
Mandarins, per case	10s.
Shaddocks, per bushel case	5s. to 6s.
Oranges (Navel), per case	15s. to 16s.
Oranges (other), per case	7s. to 9s.
Passion Fruit, per half-case	4s. to 4s. 6d.
Lemons (Local), per bushel case	9s.
Papaw Apples, per double-case	7s. to 10s.
Persimmons, per half-case	...
Pineapples (Queens), per double-case	4s. to 9s.
Pineapples (Ripleys), per double-case	5s. to 7s.
Pineapples (Common), per double-case	5s. to 7s.
Tomatoes (Queensland), per quarter-case	2s. to 4s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	AUGUST.
	Prices.
Apples, Eating, per case	7s. 6d. to 11s. 6d.
Apples, Cooking, per case	6s. to 8s.
Bananas (Cavendish), per dozen	1½d. to 6½d.
Bananas (Sugar), per dozen	1½d. to 6½d.
Cape Gooseberries, per quarter-case	5s. to 10s.
Citrons, per cwt.	12s.
Cocoanuts, per sack	12s. to 15s.
Cumquats, per quarter-case	3s. to 3s. 9d.
Custard Apples, per quarter-case	2s. 6d. to 4s. 6d.
Lemons (Lisbon), per case	6s. to 10s.
Limes, per quarter-case	...
Mandarins, per half-case	6s. to 10s.
Mangoes, per case	...
Oranges, (Navel), per case	9s. to 11s.
Oranges (other), per case	5s. to 8s. 6d.
Oranges (Seville), per cwt.	10s.
Papaw Apples, per quarter-case	1s. to 2s. 6d.
Passion Fruit, per quarter-case	4s. to 6s.
Peaches, per quarter-case	..
Pears, per half-bushel case	7s. to 11s.
Peanuts, per pound	3d. to 4d.
Persimmons, per quarter-case	...
Plums, per case	...
Pineapples (Ripleys), per dozen	1s. 9d. to 2s.
Pineapples (Rough), per dozen	9d. to 2s.
Pineapples (Smooth), per dozen	1s. 6d. to 3s.
Quinces, per case	...
Rockmelons, per dozen	...
Rosellas, per sugar-bag	1s. to 2s.
Strawberries, per dozen boxes	2s. to 6s.
Tomatoes, per quarter-case	1s. to 4s.
Piemelons, per cwt.	7s.
Watermelons, per dozen	...

TOP PRICES, ENOGGERA YARDS, JULY, 1916.

Animal.	JULY. Prices.
Bullocks	£16 2s. 6d. to £18 7s. 6d.
Bullocks (Single)	...
Cows	£8 10s. to £11 10s.
Merino Wethers	31s. 6d.
Crossbred Wethers	32s. 3d.
Merino Ewes	23s. 6d.
Crossbred Ewes	31s.
Lambs	29s.
Pigs (Porkers)	...
Pigs (Slips)	...

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JULY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JULY, 1916 AND 1915, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	July.	No. of Years' Records.	July, 1916.	July, 1915.
North Coast.	In.		In.	In.
Atherton	0·82	15	2·68	0·40
Cairns	1·52	34	2·59	3·19
Cardwell	1·43	44	2·96	0·88
Cooktown	0·96	40	2·07	1·91
Herberton	0·55	29	3·03	0·22
Ingham	1·45	24	6·48	0·71
Innisfail	4·66	35	8·42	5·79
Mossman	1·84	4	2·60	3·07
Townsville	0·50	45	3·37	0·14
Central Coast.				
Ayr	0·47	29	3·84	0·45
Bowen	0·93	45	2·64	Nil
Charters Towers	0·56	31	1·38	0·61
Mackay	1·59	45	5·22	1·72
Proserpine	0·88	13	4·20	1·14
St. Lawrence	1·25	45	3·09	0·10
South Coast.				
Biggenden	1·27	17	3·26	1·09
Bundaberg	2·04	33	2·15	1·03
Brisbane	2·31	65	2·00	1·74
Childers	1·72	21	3·10	1·64
Crohamhurst	3·06	22	3·23	2·16
Esk	2·03	29	2·12	1·12
Gayndah	1·51	45	3·14	0·58
Gympie	2·17	46	3·46	1·66
Glasshouse M'tains	2·49	8	3·60	1·54
Kilkivan	1·75	37	3·19	0·95
Maryborough	2·01	45	2 79	1·60
South Coast—continued:	In.		In.	In.
Nambour	2·75	20	3·41	1·86
Nanango	1·75	34	3·62	1·20
Rockhampton	1·47	29	2·68	0·02
Woodford	2·67	29	2·60	1·19
Darling Downs.				
Dalby	1·84	46	2·50	1·48
Emu Vale	1·46	20	1·88	2·38
Jimbour	1·78	28	2·14	1·54
Miles	1·81	31	3·43	1·99
Stanthorpe	1·97	43	2·40	1·12
Toowoomba	2·05	44	2·29	2·38
Warwick	1·84	29	1·97	3·04
Maranoa.				
Roma	1·43	42	2·56	0·82
State Farms, &c.				
Bungeworgorai	1·24	4	2·75	0·66
Gatton College	1·42	17	1·57	1·25
Gindie	1·01	17	4·44	0·38
Hermitage	1·50	10	2·05	3·17
Kairi	0·99	4	2·51	0·50
Kamerunga	1·35	26	3·64	2·71
Sugar Experiment Station, Mackay	1·23	19	5·08	0·94
Warren	1·04	3	2·99	Nil

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for July this year and for the same period of 1915, having been compiled from telegraphic reports are subject to revision.

GEORGE G. BOND,
Divisional Officer.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET AT BRISBANE AND THE PHASES OF THE MOON FOR THE THIRD FOUR MONTHS OF 1916.

Date.	SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·3	5·33	5·29	5·47	4·59	6·5	4·46	6·28
2	6·2	5·33	5·28	5·48	4·58	6·6	4·46	6·29
3	6·1	5·34	5·27	5·48	4·57	6·7	4·46	6·29
4	6·0	5·34	5·26	5·49	4·56	6·8	4·46	6·30
5	5·59	5·35	5·25	5·49	4·55	6 8	4·46	6·31
6	5·58	5·36	5·24	5·50	4·55	6·9	4·46	6·31
7	5·57	5·36	5·23	5·50	4·54	6·10	4·46	6·32
8	5·56	5·37	5·22	5·51	4·54	6·10	4·46	6·33
9	5·55	5·37	5·20	5·51	4·53	6 11	4·47	6·34
10	5·54	5·38	5·19	5·52	4·52	6·11	4·47	6·34
11	5·53	5·38	5·18	5·52	4·52	6·12	4·47	6·35
12	5·52	5·39	5·17	5·53	4·51	6 12	4·47	6·36
13	5·51	5·39	5·16	5·53	4 51	6·13	4·47	6·36
14	5·50	5·40	5·15	5·54	4·50	6·13	4 48	6·37
15	5·48	5·40	5·14	5·54	4·50	6·14	4·48	6·38
16	5·47	5·41	5·13	5·55	4·50	6·15	4·48	6·38
17	5·46	5·41	5·12	5·56	4·49	6·16	4·49	6·39
18	5·45	5·41	5·11	5·56	4·49	6·17	4·49	6·40
19	5·43	5·42	5·10	5·57	4·48	6·18	4·49	6·40
20	5·42	5·42	5·9	5·57	4·48	6·19	4·50	6·41
21	5·41	5·43	5·8	5·58	4·47	6·20	4·50	6·41
22	5·40	5·43	5·7	5·58	4·47	6 21	4·51	6 42
23	5·38	5·44	5·6	5·59	4·47	6·22	4·51	6·42
24	5·37	5·44	5·5	5·59	4·47	6·23	4·52	6·43
25	5·36	5·44	5·5	6·0	4·47	6·23	4·52	6·43
26	5·35	5·45	5·4	6 1	4·46	6·24	4·53	6·44
27	5·34	5·45	5·3	6·1	4·46	6·25	4·53	6·44
28	5·33	5·46	5·2	6·2	4·46	6·25	4·54	6·45
29	5·32	5·46	5·1	6·3	4·16	6·26	4·55	6·45
30	5·30	5·47	5·0	6 3	4·46	6·27	4·55	6.46
31	...	...	5·0	6·4	...	...	4·56	6·46

The Phases of the Moon commence at the times stated below in Queensland, New South Wales, Victoria, and Tasmania.

			H.	M.	
5 Sept.	☾	First Quarter	2	26	p.m.
12 „	○	Full Moon	6	31	a.m.
19 „	☽	Last Quarter	3	35	p.m.
27 „	●	New Moon	5	34	„

The moon will be nearest the earth on the 9th at 11·24 p m, and farthest from the earth on the 21st at 7·36 p.m.

4 Oct.	☾	First Quarter	9	0	p.m.
11 „	○	Full Moon	5	1	„
19 „	☽	Last Quarter	11	8	a.m.
27 „	●	New Moon	6	37	„

The moon will be nearest the earth on the 7th at 8 30 a m., and on the 19th, at 3·12 p.m., at its farthest distance.

3 Nov.	☾	First Quarter	3	50	a.m.
10 „	○	Full Moon	6	18	„
18 „	☽	Last Quarter	8	0	„
25 „	●	New Moon	6	50	p.m.

The moon will be nearest the earth on the 1st at 4·48 a.m., and on the 28th at 5·42 a.m.; it will be farthest from the earth on the 16th at noon.

2 Dec.	☾	First Quarter	11	55	a.m.
9 „	○	Full Moon	10	44	p.m.
18 „	☽	Last Quarter	4	6	a.m.
25 „	●	New Moon	6	31	„
31 „	☾	First Quarter	10	7	p m.

The moon will be farthest from the earth on the 14th at 6·48 a.m., and nearest on the 26th at 10·30 a.m.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise and sunset are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during September, October, November, and December may be roughly arrived at by adding 16 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

Farm and Garden Notes for October.

FIELD.—Under ordinarily favourable conditions, harvesting the wheat and barley crops may now begin. Those who have oats for hay should cut it when the grain has formed, but before it is ripe, for then the plant is in its most nourishing condition. Destroy caterpillars on tobacco plants, and top the latter so as to throw all the strength into the leaves. Keep down the weeds, which will now try to make headway; earth up any growing crops requiring the operation; sow maize, imphee, setaria, kafir corn, teosinte, sorghum, &c. Plant sweet potatoes, sisal hemp, yams, peanuts, and ginger.

KITCHEN GARDEN.—Why do so few gardeners and farmers grow their own vegetables? This is a question frequently asked by visitors to the farming districts. The reason probably is, that vegetables require a good deal of care and attention, which means also a good deal of time taken from the ordinary farm work. In many cases it pays the farmer better to buy many kinds of vegetables than to grow them himself. The only vegetables grown on many fine farms are cabbages and pumpkins, not to class potatoes under the head. Many people have an idea that European vegetables cannot be grown during the hot summer months, but this is a great fallacy; the Chinese gardeners supply the towns with all kinds of vegetables, except, perhaps, cauliflowers, during the whole of the summer. It is, therefore, clear that, by constant work, plenty of manure, water, and some shade for seedlings, most vegetables can be produced during the hot months from November to March. If your ground has been trenched or deeply dug and well worked, the advantages will be seen during the coming months. It does not pay to work shallow-dug ground. When sowing and planting during this month, give plenty of room between the rows and the plants; otherwise they will be drawn up and worthless, and keep the ground open by constant forking and hoeing. Thin out melon and cucumber plants. It is a good plan to peg down the vines; they will then not be blown about by the wind; they will take root at intervals, and thus help the main stalk. Give plenty of water to tomatoes planted out last month. They should also be mulched. Sow cabbage, French beans, melons, lettuce, radishes, pumpkins, cucumbers, marrows, rosellas, &c.; and transplant for succession in calm cloudy weather.

FLOWER GARDEN.—Stake any dahlias which may be now above ground, and plant out the bulbs which were stored in a moist place. If the weaker bulbs are reserved, they will come in for autumn planting. Take up all bulbs which have done flowering, and store them in a dry place. Winter-flowering plants will have gone off almost; still, the garden should be in full bloom, and will well repay the trouble bestowed on it, and a little fertiliser given as a top-dressing will assist the plants to bloom and look well for a longer time than if they were neglected. Give weak liquid manure to chrysanthemums, and allow no suckers to grow till the plants have done flowering. Take up narcissi. Do not store them, but plant them at once in new situations. Sow antirrhinum, balsam, zinnia, summer chrysanthemum, calliopsis, and nemophila.

Orchard Notes for October.

THE SOUTHERN COAST DISTRICTS.

November is somewhat of an off month for fruit, as the crop of strawberries is about over; pineapples, with the exception of a few off-season fruit, are not ready for marketing; and citrus fruits of all sorts, with the exception of those grown in the latest districts, are now over. Bananas should, however, be improving, particularly if the season is favourable.

The most important work of the month is the cultivation of the orchard, as, in order to retain moisture in the soil, it is essential that the soil be kept in a fine state of tilth. Where land is liable to wash, breaks should be left between the fine-worked land, or, even better, a good break of cowpea or other leguminous crop, valuable for producing nitrogen and humus, should be grown. All fruit pests should be attended to; cyaniding can be carried out where necessary, and is especially useful now in the case of the Red, Purple, Mussel, Circular Black, and Glover Scales. Fruit-fly should be systematically fought; all infested plums, peaches, guavas, or other fruits should be gathered and destroyed, so as to prevent the spread of the pest. Sucking bugs of all sorts should be gathered and destroyed, the egg-clusters, as well as the immature and mature insects, being destroyed. Hand-gathering is as good a plan as any. Fig beetles should be destroyed by spraying with Kedzie's mixture; and the egg-clusters should be destroyed whenever found.

Bananas and pineapples can be planted during the month, taking care, in the case of the pineapples, not to set out suckers that will immediately throw out a fruit, but those that will become firmly established before they fruit. Examine the vineyard carefully, and keep it well worked. Look out for Oïdium and Black Spot, and treat for same as recommended in the Orchard Notes of the two previous months.

Early ripening grapes will be reaching maturity towards the end of the month; but few, if any, will be ripe. In any case do not market too immature fruit; rather wait a few days longer, till it is fit to eat.

THE TROPICAL COAST DISTRICTS.

The main crop of pineapples will ripen during the month; and if gathered at the right time—viz., when fully developed, but not turned colour—they will carry all right South, if carefully handled and well packed. Papaws and granadillas are still in season, and will meet with a good Southern demand; they must be packed in cases containing only a single layer of fruit, and should be sent in the cool chamber. I am certain that a good market can be got for these fruits in both Melbourne and Sydney, particularly at this time of year, when their winter fruits are off and their summer fruits are not yet on.

Watch bananas carefully for fly. Keep the orchards well cultivated.

Only ship good mangoes South; far too much rubbish is sent to Brisbane. Good mangoes will pay to pack properly, but the common sorts, which predominate to an enormous extent, will barely pay freight, if there is a good crop. The canning of good types of fibreless mangoes of good flavour is well worth taking up commercially in the North, as a ready sale for the canned fruits can be obtained.

As in the Southern Coast districts, all fruit pests should be systematically fought, and the orchard should be kept in a good state of tilth, as, once the wet season starts, there is little chance of cleaning up weeds and rubbish of all kinds, or of cultivating and sweetening the soil.

THE SOUTHERN AND CENTRAL TABLELANDS.

The earlier kinds of summer fruits, such as cherries, will ripen during the month. See that, if the fruit-fly makes its appearance, it is systematically fought.

Look out for Codling Moth, and continue the sprayings with Kedzie's mixture.

Look out carefully for any San José Scale that may have escaped the winter spraying, as, if the trees are sprayed whilst the young are hatching out, the bulk of the insects are killed and little damage is done either to the tree or fruit.

The sulphide of soda spray is one of the best to use now. Keep Woolly Aphis in check, should it make its appearance, using the resin washes; or, if it and San José Scale are both present, use the sulphide of soda spray.

Watch the vineyards carefully for Black Spot and Oïdium. Keep the orchard and vineyard well cultivated, so as to retain all the moisture in the soil required for the growth of the tree and development of the fruit. In the warmer parts, irrigate when necessary, following the irrigation by deep and systematic cultivation.

See that grape vines have plenty of foliage to protect the ripening fruit from sun scald, but yet not so dense a foliage as to induce Oïdium or Black Spot. Lood out for Red Scale on citrus trees, and cyanide to check same. Look out for fruit-fly in the early-ripening fruits, and gather and destroy all that may be so affected.

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Agriculture.

COTTON CROP OF 1915-16.

The total cotton crop harvested last season amounted to only 11 tons; whilst in the previous year the yield was less than half that quantity, seed cotton being understood. In every 1,000 lb. of seed cotton, there are 400 lb. of lint and 600 lb. of seed. Thus the 11 tons of last year's crop gave a return of 4,400 lb. of lint and 6,600 lb. of seed. In the local market the lint is worth 7d. per lb.; and, from advices received from the United States of America and London, the price of cotton is rapidly advancing. Latest advices give the current price at 9d. per lb.; but, owing to the ravages of the boll weevil and of a new and even worse pest, called by the significant name of "Red Hot," combined with a very wet season, the American cotton crop will be very short and prices must

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rise. Hermann and Wolf, cotton brokers in New Orleans, wrote on 24th June as follows:—

"We stated in these letters not long ago that the world would likely need a crop of 15,000,000 bales the coming year, even should the war continue. The steady depletion of the stocks in Europe and this country since then has given increasing emphasis to this size crop being a probable requirement. The trend of the takings by the spinners of the world clearly supports this view also.

"Leaving out only the northern part of Georgia and the two Carolinas, the damage the weevil is almost certain to do east of the river, clean through to the Atlantic coast, and the lack of fertiliser in that section make the production of such a crop rather problematical. Conditions could easily develop that would make the crop 1,000,000 bales less, or even a greater amount."

T. O. Walton, Chief of Farm Demonstration Work Extension Service, A. and M. College Station, Texas, wrote on 17th June:—

"Last fall the E.S. and the Department of Agriculture called the attention of the Texas farmers to the boll weevil situation then existing, and suggested that, unless the stalks were turned under or cut and burned early and the winter hibernating places destroyed, there would be a very heavy infestation of the weevil in 1916. Many of the farmers profited by these suggestions. Many of them, however, did not, and at this time the boll weevils are making their appearance in practically all of the States except the extreme northern part of the Texas cotton belt. Without doubt we have the heaviest infestation of weevils coming out of winter hibernation this spring that we have had for a number of years, and, if the cotton growers do not observe every precaution, the damage of the 1916 Texas cotton crop will probably be 500,000 bales. At the present price of cotton this will represent a direct loss to Texas farmers of 30,000,000·00 dollars for the 1916 crop. A large percentage of this loss can be prevented if the farmers in the weevil-infested territory will use the precautions advocated by the U.S. Department of Agriculture and the Extension Service of the A. and M. College.

"At the present time, while the cotton is yet very small, some of it without squares and some just beginning to set squares, the farmers will find it profitable, provided cheap labour can be secured, to have the weevils hand-picked and killed, and all punctured squares picked and burned. One adult weevil, or one square that has young weevils growing on it, destroyed now, will mean several thousand weevils less within the next few weeks."

The directions for further measures for the destruction of the weevil, if carried out in this State, would effectually put a stop to any cotton growing in Queensland. Fortunately, we have no boll weevil or "Red Hot" here; and the Department of Agriculture will take every precaution to prevent its introduction with imported seed.

In view of the almost certain shortage of cotton this coming season in the United States, the prospects for growers in this State are very good; and we would advise farmers to take advantage of the opportunity offered by the Department of Agriculture and Stock to obtain a supply of the best variety of American cotton seed. A 5 or 10 acre plot of cotton can easily be attended to without in the least interfering with the production of other crops or with the work of the dairy. As regards the picking, it should be noted that all the bolls do not mature at the same time, so that continuous work is not required in order to get in the whole crop. Taking the cost of picking at ½d. per lb., the selling price of seed cotton at 1¾d. per lb., and the crop at 1,000 lb. per acre, the net profit from 10 acres would be £52 4s. 8d. without reckoning the value of the seed (about 2 tons 13 cwt.) at £12 per ton, total, £83 in round numbers, or £8 6s. per acre nett. It must be understood that, although the Department offers 1¾d. per lb. for seed cotton of any good variety, whatever profit arises from the sale of the cotton when ginned, or from the seed if sold, will be distributed *pro ratâ* amongst the farmers who supply cotton to the Department.

UTILISING MAIZE STALKS.

From 220 lb. of maize stalks, they now produce in the United States by modern processes and machinery 22 lb. afrecho, 24 lb. feeding cake, 9 lb. maize oil, 73 lb. flour, 48 lb. glucose, 4 lb. dextrine, and 26 lb. starch. When maize was grown on a large scale in the mid-western and southern States of U.S.A., it was customary either to turn cattle into the fields after the harvest, or to allow stockowners to do so for a nominal payment of 2s. per acre.

During the last five years, however, science has stepped in, and revolutionary discoveries were made owing to which "the despised maize stalk has become almost as valuable as the grain it produces," and many farmers, instead of 2s. per acre, are now receiving 16s. 8d. to 33s. 4d. per acre. In the great maize belt, which runs through eight of the States, there are about 50,000,000 acres dedicated to the cultivation of maize, so that, if only 16s. 8d. per acre is added to the value of their produce, it means an addition of over £40,000,000 to the income of the farmers. The products of the maize stalks are so various, and each of such utility, that there does not appear to be much risk of the demand for them falling short of the supply. These are the articles that have already been made on a commercial scale from the stalks:—

(1) Cellulose for packing coffer dams of battleships, thus preventing them sinking when pierced with shells, because the water on first entering is absorbed, causing the pith to swell, closing up the perforation automatically as it were.

(2) Pyroxyline varnish, a liquid made from cellulose, the uses of which are practically unlimited.

(3) Cellulose for making smokeless powder and other high explosives.

(4) Cellulose for packing, it being the most perfect non-conductor known against heat or electricity, jars or blows.

(5) Paper pulp; and it is predicted that fine book paper will be one of the principal products of the stalks, and will arrest the alarming destruction of the American forests for wood pulp, which is now proceeding.

(6) Stock food made from the finely-ground outer shells, and from the sides and joint of the stalks.—"Pastoral Review."

A NEW COTTON-PICKING MACHINE.

The cotton planters in the United States of America are surely on the high road to the invention of a really practical cotton-picking machine. Not a year passes during which some new machine, or an improvement on older ones, is brought forward. In the "Cotton and Cotton Oil News," published at Memphis, Tennessee, for 24th July, a new inexpensive machine is depicted and described as follows:—

THE SOUTHERN COTTON-PICKER COMPANY OF MEMPHIS HAS PUT OUT A NEW DEVICE FOR PICKING COTTON, SIMPLE AND SUCCESSFUL THEY CLAIM.

A machine to pick cotton from the bolls has long been the dream of inventors as well as of cotton-growers.

It is a problem which has challenged the inventive genius of man.

Yet it would seem not to be a more difficult problem to solve than that which confronted Whitney when he set about to devise a machine for separating the lint from the seed. Whitney succeeded, and to-day the cotton gin links his name with a fame that can never die.

The same measure of immortality awaits him who shall make a machine to save the labour of hand-picking and facilitate the gathering of the great cotton crop.

Many have been the efforts in this direction, but the Southern Cotton-picking Company of Memphis, Tenn., claims to have solved the problem.

A cut of this machine is given here. It certainly is not complicated, and it appears easy of operation, as it is simple in construction. It does not pick with suction, but with brushes.

The picker head, which is driven by a flexible shaft, contains two bristle brushes that mesh together at a velocity of 400 revolutions a minute; a small pin wheel, with teeth, combs the cotton from the brushes, then conveyed through a 1½-in. tube into container sack in rear by air, a small fan creating the vacuum back of the picker head which conveys the cotton into the sack.

The operator, after starting the engine, has nothing to do but apply the picker head with flexible tubes to each boll that is open, and instantly the cotton is deposited in the conveyor used for this purpose.

The picker head is protected against entry of any trash or bolls by a wire guard over its end just outside of the brushes, through which guards the brushes lap, pulling the cotton into same, making it impossible for a boll to go through this guard, and nearly so for any section of a boll to enter the brushes. This system will not pick either dry or green leaves unless small particles of leaf should adhere to the back of cotton when same is picked.

It is made for one man to handle in the field.

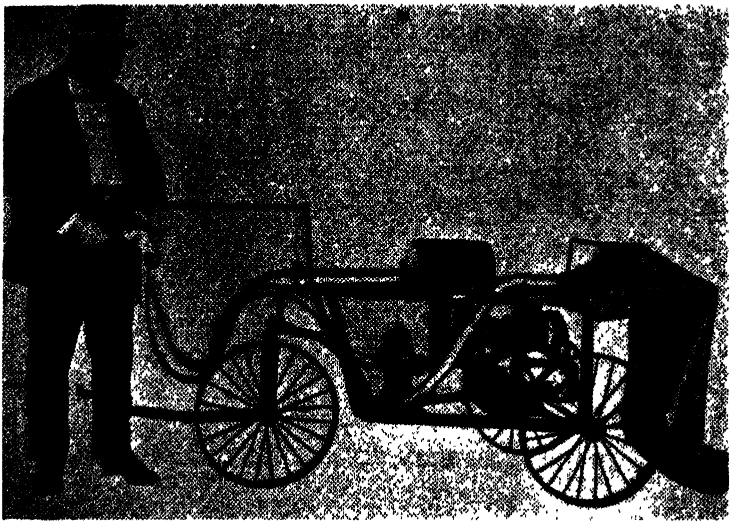


Plate 23.—A New Device for Picking Cotton.

Being constructed of iron, steel, and aluminium, it is light and durable. It is driven by less than half a gallon of petrol for 12 hours.

Here is the proof of the pudding. They say: "We averaged in January in a muddy field with cold weather, wearing gloves, with our cotton picker, 60 lb. an hour."

For further information, write the Southern Cotton Picker Company, Memphis, Tenn.

LEACHING OF NITRATES FROM THE SOIL.

During a discussion at a meeting of planters in Madras, the question of nitrates was raised, and it was suggested that saltpetre might perhaps replace sulphate and muriate of potash during the war. This is now always feasible. In the first place, while it is true that saltpetre is an excellent source of potash, it also contains 10 per cent. of nitrogen in the form of nitrate which cannot be ignored. The soil does not retain nitrates like it absorbs potash, and the consequence is that if the application of saltpetre is followed by heavy rain the nitrate part of it is leached out into the drains and is lost. It might be possible to always apply it at a time when the rains are only light, but this is not always convenient from a labour point of view, and it is not in all cases desirable that the crop should get a heavy dose of quickly available nitrogen which will give it a flush of foliage. Saltpetre is a high-priced fertilser, so that one cannot afford to apply it in wet weather and allow the nitrates to deliberately be lost for the sake of the potash; and consequently it will not altogether and in all cases replace the ordinary potash fertiliser.

The extent to which nitrates do wash out of the soil is illustrated by Messrs. E. J. Russell and A. Appleyard in an article published in the May issue of the "Journal of the Board of Agriculture," the following digest of which is extracted from "Nature":—

"Of the Broadbank dunged plots at Rothamsted one was fallowed and one cropped during the winter of 1915-16. During the summer the fallowed plot accumulated nitrate until by the middle of September the top 18 in. of soil contained 170 lb. of nitric nitrogen per acre, equivalent to nearly 10 cwt. of nitrate of soda. The losses then began, and were so heavy in November and December that by February the magnificent stock of nitrate had been reduced to 50 lb. of nitrogen. This loss is equivalent to 7 cwt. of nitrate of soda—no small item at present prices. The Broadbank fallow plot is no doubt an extreme case, but the cropped plot also suffered considerable loss. It never accumulated nitrate like the fallow plot, the maximum being 90 lb. of nitrogen per acre; half of this was lost during the winter, or as much nitrogen as is contained in 24 bushels of wheat and the corresponding amount of straw. The losses are naturally greatest on these heavily manured soils, but the fields which were not unusually well done lost about 30 lb. of nitrogen per acre. Some of the loss on the fallow plot could have been prevented by sowing mustard or other quick-growing crop in September. This could have been fed off or ploughed in, thus holding the nitrogen in less soluble form until the spring. The obvious lesson is that land which has been got into good condition in autumn should at once be sown with either the crop it is intended to carry or a catch crop."

A green dressing established on the land following an application of nitrates, especially if wet weather is to be expected, is undoubtedly a good thing, and it goes far to prevent loss by leaching. In the case of coffee, however, this is not always possible on account of the shade, which prevents the green dressing growing.—"Planters' Chronicle," Madras.

GRAIN OR DRY DISTRICT SORGHUMS.

By G. B. BROOKS, Instructor in Agriculture.

In tropical and subtropical countries the raising of a more consistent producing grain than maize has, during recent years, received a good deal of consideration. Reports coming to hand from various countries show that the grain sorghums give promise to become of equal importance to maize. The qualities that recommend them are: Heavy yields of grain, high feeding value, drought resistance, and freedom from insect pests and disease.

As showing the extent to which these sorghums are raised in other countries it is estimated that in India some 25,000,000 acres are raised annually, while extensive areas are under this crop both in China and South Africa. Considerable expansion has lately taken place in the United States of America.

Its introduction into Queensland is by no means of recent date. In the annual report of the department for the year 1889-90 mention is made of the introduction of Kafir Corn, Yellow Milo, and several saccharine varieties. Very favourable reports were received as to their suitability to Queensland conditions, but their use either as a grain or fodder crop did not in any way become general. Since then scattered introductions have been made from time to time, but it is only recently that the question of ascertaining their true value has been taken in hand.

CLASSIFICATION.

There has been no complete botanical classification of the sorghum family. The species *Andropogon sorghum* is held to include all groups of cultivated sorghums. There are hundreds of strains or varieties, and these have been separated into two divisions—viz., the saccharine and non-saccharine.

Saccharine or " Feed" Sorghums.—The stalks of this type contains a large amount of sweet juice which, in some countries, is made into syrup. In Queensland they are grown exclusively as a fodder. This type is also recognised by the grain, which has a bitter astringent taste.

Grain or Dry District Sorghums.—In this type there is little or no saccharine matter in the stalk. The grain is non-astringent and has a slightly nutty flavour. It is largely used in India, China, and Africa for human consumption; hence the term " Grain Sorghum."

TESTS CARRIED OUT.

Several promising varieties of this crop were introduced from the United States of America two seasons ago and propagated at Gatton College. Seed was secured from this planting for experimental purposes, and during the past season demonstration plots were established in various parts of the State, the objective being to ascertain their grain-producing qualities under varying conditions of soil and climate. The season was, on the whole, very favourable to this test. In several districts where the maize crops were—on account of the absence of rain—practically a failure, yields as high as 50 bushels per acre were harvested from the grain sorghums. Unfortunately, in several centres the plots were attacked by flocks of parrots, making it impossible to secure dependable data as to yield.

The varieties planted in the respective districts were—Cream Milo, Feterita or Soudan Dhoura, Standard Milo, Shantung Dwarf Kaoliang, Dwarf Milo, Valley Kaoliang, and Black Hull Kafir.

The term " Milo" is a corruption of the word Milium—Millet. Kaoliang is Chinese, Kao—large, Liang—Millet. Dhoura or Durra is the

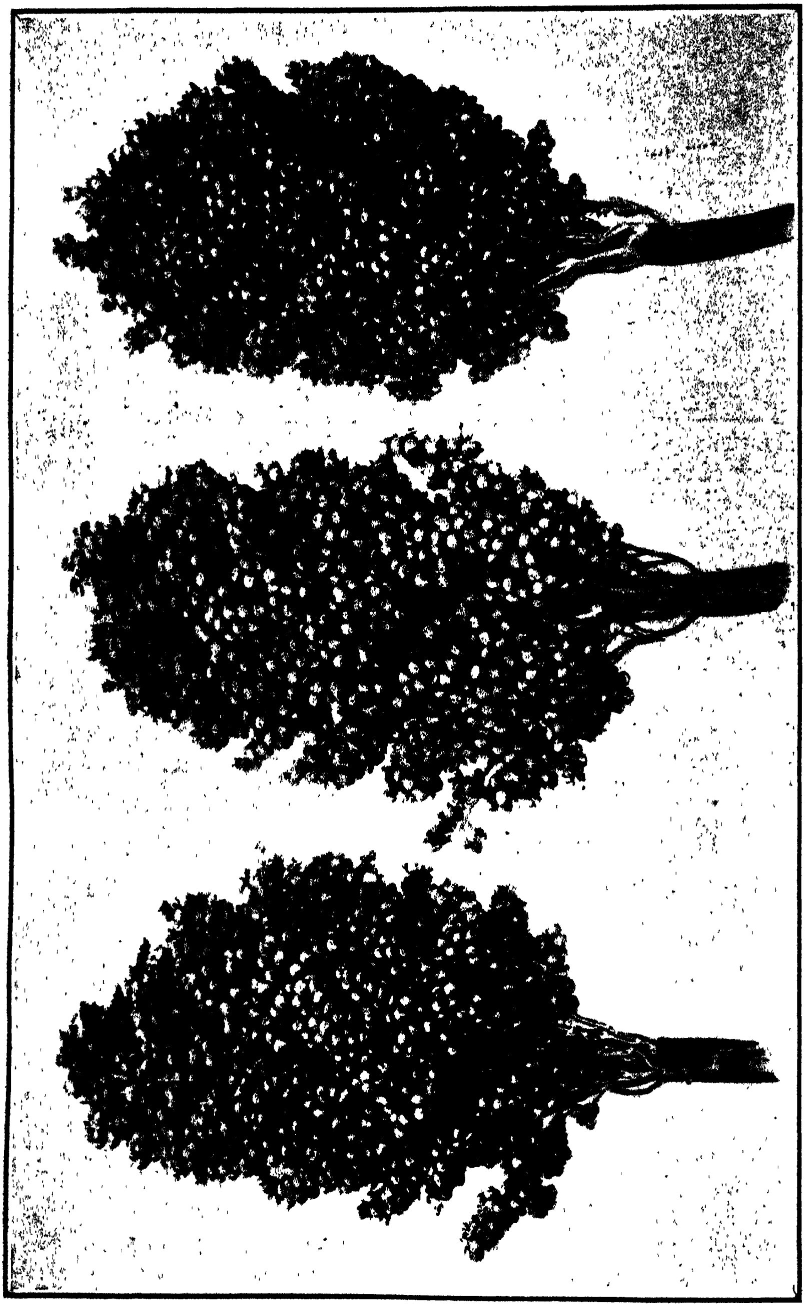


PLATE 24.—GRAIN SORGHUMS.

1. Standard Milo. 2. Cream Milo. 3. Dwarf Milo.

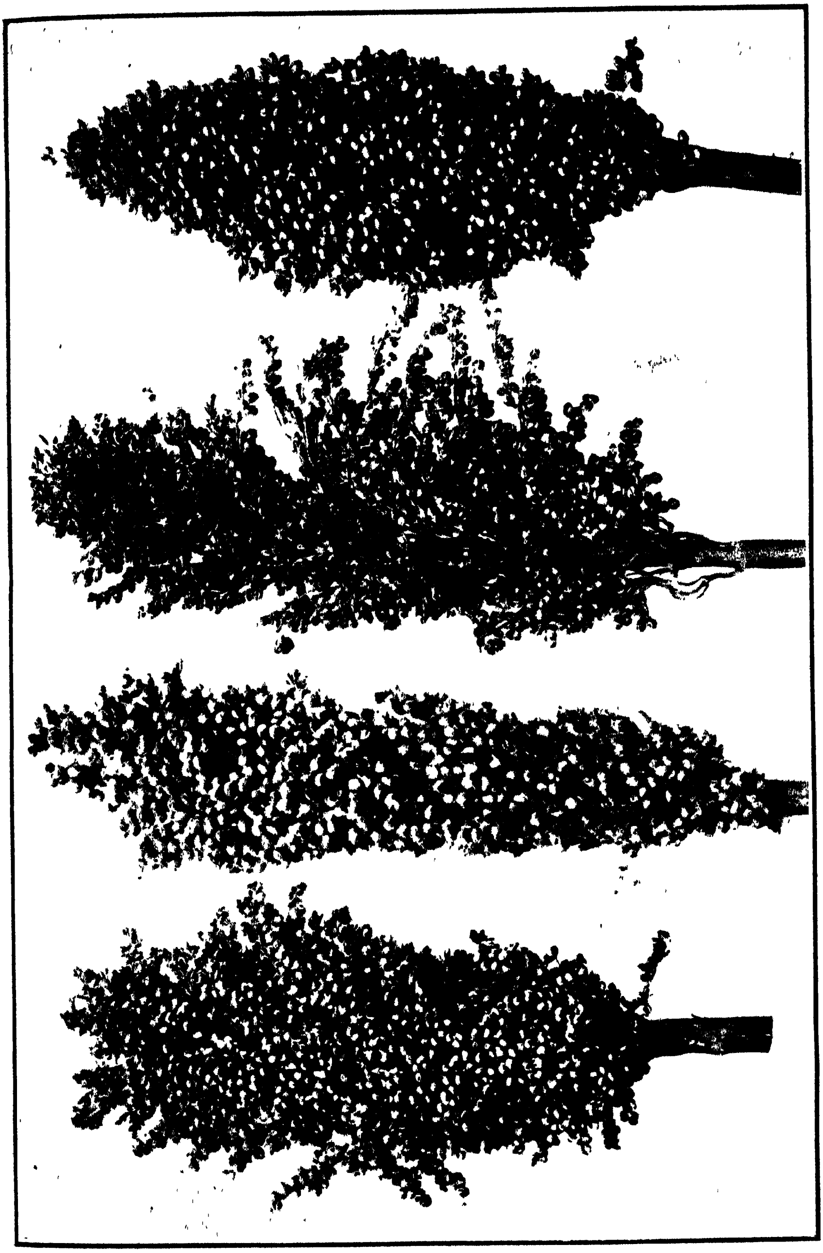
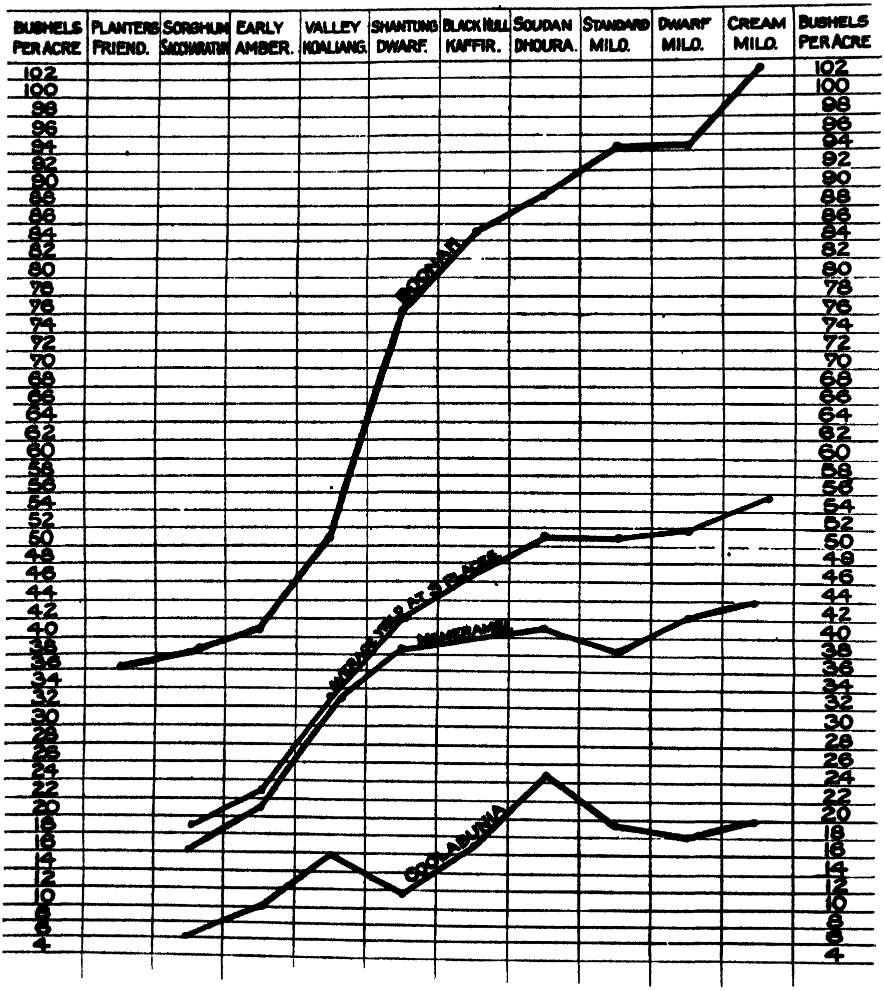


PLATE 25.—GRAIN SORGHUMS.

1. Black Hull Kafir. 2. Soudan Dhoura. 3. Valley Kaoliang. 4. Shantung Dwarf Kaoliang.

Indian name for grain-bearing sorghums. Illustrations of typical heads of the above varieties are shown on Plates 24 and 25.

The accompanying Graph shows the yield per acre at three centres.



SORGHUM DEMONSTRATION PLOTS

SEASON 1915-16.

Showing Variation and Yield of Grain obtained in Three Districts.

VALUE AS A FODDER.

Although the saccharine sorghums are grown principally for the grain, they are likely to become of considerable value as a fodder crop in the drier portions of the State, on account of their drought-resistant qualities. A comparison was made in connection with the experiments carried out, by including three of our heaviest yielding fodder varieties, viz.—Planters' Friend, E. Amber, and Saccharatum. The yield in tons per acre are shown in Graph No. G.

BRIEF HINTS ON GROWING THE CROP.

Climate.—Conditions suitable for growing maize are equally adapted for grain sorghums; but, being a dry-district crop, much better results will be secured in hot, dry situations than from corn. Frost is fatal to the maturing of the crop, more especially in the coastal districts.

Soil.—Although adapted to a very wide range of soil, best results are obtained from fairly heavy loams. It is imperative that a plentiful supply of plant food should be available, owing to the quick-maturing habit of this group of plants. This is induced by early and deep cultivation. Good results are often secured in low, damp situations, where the growing of maize would be unprofitable.

Time to Plant.—Being a heat-loving plant, sowing should be deferred until the soil is warm and sufficient moisture present in the soil to insure germination. The time taken to mature by most of the varieties is about three and a-half months in Southern Queensland. It would, therefore, not be advisable to plant much later than the middle of January. Sowing operations could be continued to a much later date in both the Central and Northern divisions.

Method of Planting.—The distance between the rows should not be less than 3 ft. In soils of rather low fertility 3 ft. 6 in. is recommended. Sowing can be carried out with the ordinary maize-planter, either fitted with special plates or drilling smaller holes in those used for maize, filling up the large openings with lead or cork. The small openings should be countersunk from below, otherwise the grain will set fast in the holes. In planting small areas the rows can be opened up either with the plough, scuffler, or spring-tooth harrow. The seed can be dropped by hand, using a coffee or syrup tin tied to a walking-stick. Two or three holes are punched in line through the bottom of the tin from inside—a little larger than the seed to be planted; and by shaking this device a very even seeding can be obtained. Harrows are used for covering the grain. The wheat-drill may also be used by closing up a number of the tubes so that the rows will be the required distance apart. The depth to plant depends to some extent upon the character of the soil and the amount of moisture present. A covering of from one to two inches is generally sufficient.

SEED REQUIRED PER ACRE.

When grown for grain in rows 3 ft. 6 in. apart, 3½ lb. of seed is sufficient to sow an acre. In planting a large-grained variety, such as

Feterita, a little more seed is required, while of a smaller-grained sort, such as Black Hull Kafir, a little less can be used. If intended for fodder an extra pound of seed to the above may be used per acre.

AFTER-CULTIVATION.

When the plants are well up the field should be gone over with light harrows. This should be followed shortly after with the scuffler, cultivating deeply before the roots have developed and lightly after. Frequent stirrings invariably mean high yields.

HARVESTING.

When grown for seed the crop should be allowed to stand until the grain is quite hard. If cut before being fully ripe the grain will not only be more difficult to thresh out but will be liable to mould when stored and to infestation by weevils.

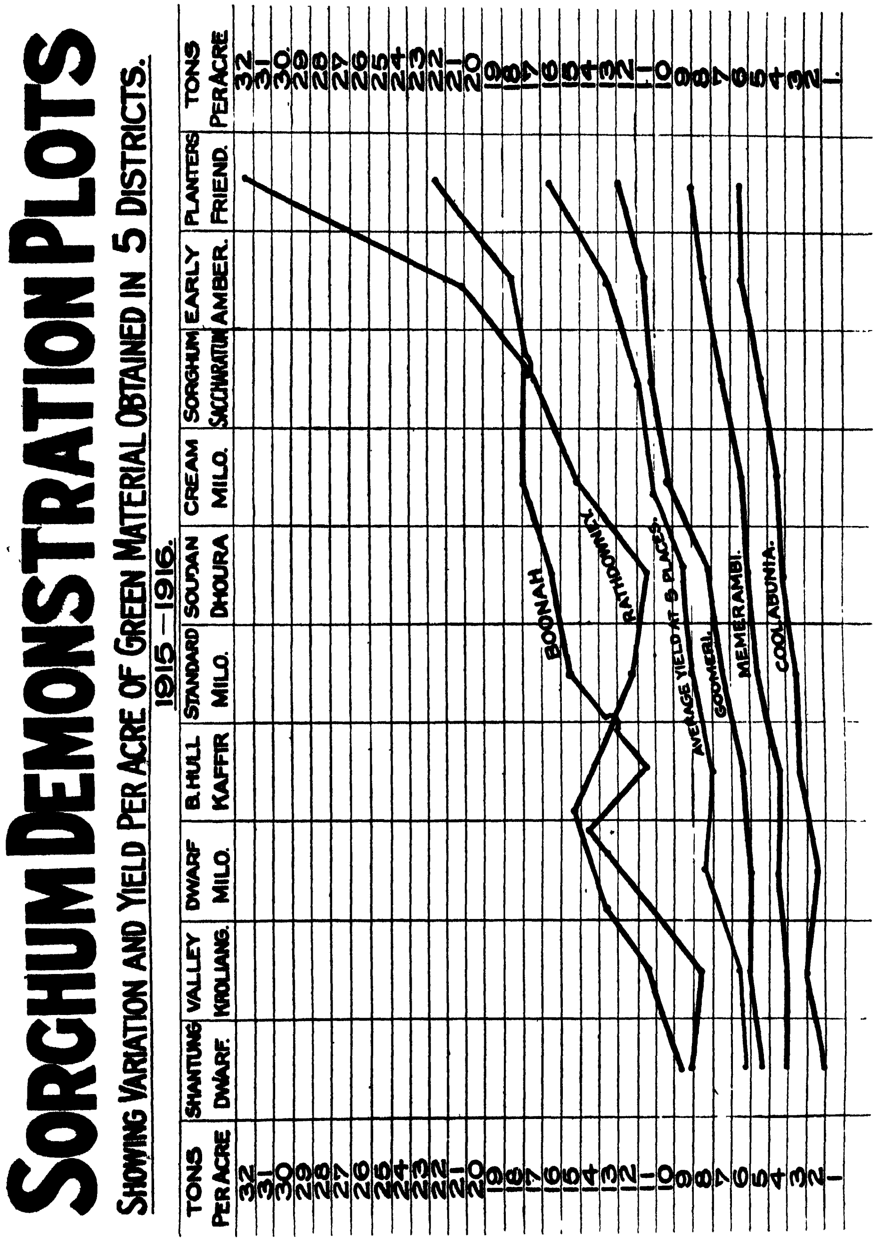
Dwarf varieties can be harvested with the ordinary wheat-binder or maize-harvester. Small areas can be headed with a large knife and carted direct to the barn. The wheat-thresher is undoubtedly the best machine for removing the grain. Several types of corn-shellers can also be used, the concave being set much closer to the drum than for maize. The broom millet hackler does not make a satisfactory thresher, on account of the pegs stripping the seed off in bunches. This defect can be overcome by screwing pieces of timber to the drum of equal depth to the pegs. A similar piece should be fixed to the breast of the machine and almost close to the drum to insure clean threshing.

IMPROVING THE CROP BY SELECTION.

The grain intended for future plantings should be selected from the standing crop. Only heads that are true to type, of even height, early maturity, dwarf habit, erect and fairly compact heads, with freedom from side branching and stooling, should be selected.

With the object of improving the quality of the crop the Department of Agriculture last season established stud plots in several districts. A feature of these stud plots was the "ear-to-row" tests, each ear or head being planted in a separate row. Very satisfactory results were obtained. These tests are being continued during the coming season with seed carefully selected from last season's operations. Before threshing out the grain the average weight of the heads of the respective varieties were recorded. Those were exceptionally heavy, as was to be expected from the high yields obtained and shown in the accompanying graph.

The averages were, in ounces: Black Hull Kafir, 3 4/5; Cream Milo, 4¾; Valley Kaoling, 3½; Dwarf Milo, 4¼; Shantung Dwarf Kaoling, 3 1/5; Standard Milo, 4¼; Feterita, 4; Selected Crossbred, 7 oz.


SORGHUM DEMONSTRATION PLOTS

SHOWING VARIATION AND YIELD PER ACRE OF GREEN MATERIAL OBTAINED IN 5 DISTRICTS.

1915–1916.

Theoretically a crop grown, say, of Cream Milo, with six heads to the square yard, and each head weighing 4¾ oz., would give a yield of 153 bushels of 56 lb. each per acre.

FEEDING VALUE.

This is very satisfactory, as shown by the following analysis and remarks made by the Agricultural Chemist, Mr. Brünnich. It will be noted that a comparison is made with wheat and maize.

Variety.	Moisture.	True Protein.	Starch	Crude Fibre.	Fat.	Ash.	Total Nitrogen.	Protein Nitrogen.
St. Milo	10·94	10·22	70·34	3·18	3·51	1·81	1·652	1·638
Dwarf Milo ..	13·50	9·17	69·71	1·98	3·30	1·84	1·610	1·549
Soudan Dhoura ..	13·56	13·56	65·52	2·18	3·21	1·97	2·225	2·170
Cream Milo ..	13·25	11·02	68·34	2·03	3·35	2·01	1·854	1·765
Average Wheat ..	11·10	14·80	67·40	3·20	2·20	1·30	..	2·368
Maize ..	12·	13·10	65·80	2·00	5·50	1·60	..	2·096

Remarks.—" The analysis of the grains of the non-saccharine sorghums prove these grains to be a valuable food for horses, cattle, swine, and poultry. The best sample—Soudan Dhoura (Feterita)—closely approximates, and although not quite so rich in oils it is equal with regard to protein and carbohydrates. No strict comparison can be made between these grains and wheat or maize on account of great individual variation; but on the whole they must be classed as more starchy, and should therefore be particularly valuable for the production of industrial alcohol. The grain can also be made into a tasty and nutritious meal for human consumption."

The white or cream varieties should be selected for household use. Both Soudan Dhoura and Cream Milo are excellent in this respect, making a delicious porridge either alone or mixed with other meals.

The grain can be treated with a small hand grinding-mill, of which there are several kinds on the market. A cheap and effective method for grinding small quantities is by using a coffee-mill, costing about 10s.

MARKET GARDENING.

AN APPLIANCE FOR DESTROYING THE FRENCH BEAN FLY.

BY R. E. GARDINER, Townsville.

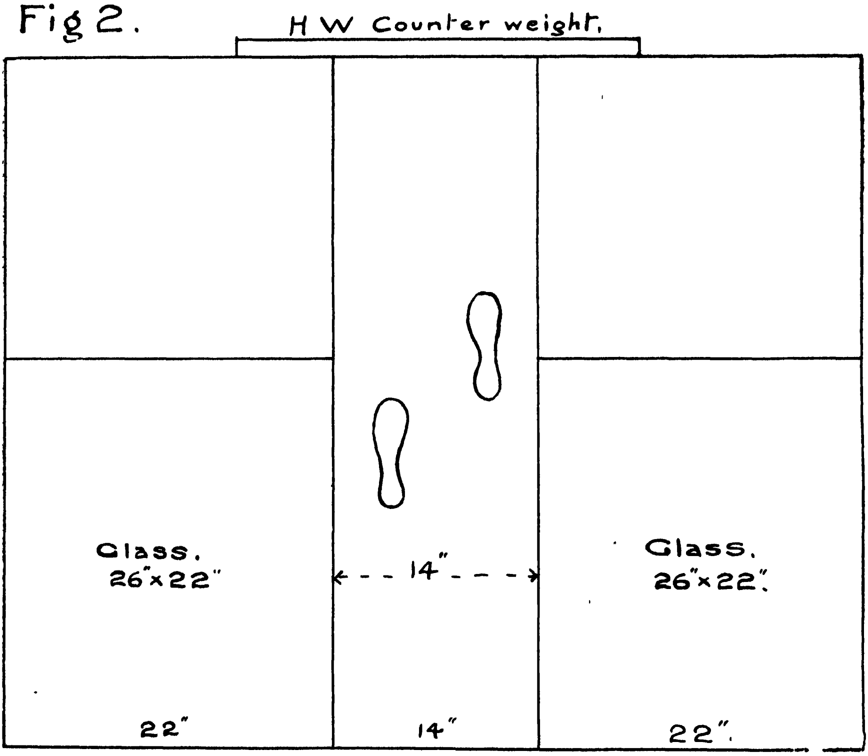
The following is a description of an appliance designed by the writer for destroying the French bean fly. Its action depends upon a habit which the fly has of invariably making a rapid upward flight when disturbed:—

The appliance in its simplest form consists of a sheet of window glass set in a light wooden frame. A drape or curtain of calico about 6 in. wide is attached to three sides of the frame. If the frame be now held 6 in. from the ground in a horizontal position, an enclosure on three sides is made by the suspended drape, the glass forming a roof to the enclosure.

A pair of wooden handles about 4 ft. in length are attached to the upper side of the frame at an angle of about 45 degrees. The appliance is now ready to use. To use, the frame is first inverted, and the glass sprinkled lightly with kerosene. The kerosene quickly spreads into a thin film over the surface of the glass.

The frame is now returned to its original position. The film of kerosene is now on the under side of the glass. The frame is carried over the young bean plants, open side of the enclosure first, being held so that the front of the frame is 9 or 10 in. from the ground; and the rear part just allows the glass to clear the young bean plants. The advancing sheet of glass passes over the flies before they rise, and, being disturbed by the drape, they fly sharply upward, strike the glass, become saturated with kerosene from the film, and die instantly. Many of the dead flies adhere to the glass; others fall to the ground.

Fig 2.



The foregoing appliance will serve for very small gardens.

For larger gardens a double frame may be made, as in Fig. 2, and carried by the hands or suspended by a pole from the shoulders. It may be made of light laths and the lightest make of glass.

For large market gardens a horse-drawn machine, such as is used by the writer, may be constructed as follows:—The two ends of the frame are cut from a piece of 12 by 1 pine to the shape and size shown in Fig. 1. Along the outer face of each end at the lower edge, a piece of 3 by 2 hardwood (*a*) is bolted. This hardwood projects about 9 in. in front of the frame, and is dressed upwards at this end and acts as a sled runner. A piece of 3 by 1½ pine (*b*) is now bolted crosswise on the inner face of each end, projecting 12 in. at the top side.

The ends are now connected by horizontals of 3 by 1½ pine at the points (*c*) and (*d*). These horizontals are bolted to the upright (*b*). At (*f*) a horizontal of 3 by 2 pine is fixed to each end by means of an angle of 1½ by ⅜ bar iron, which is bolted to the inner face of each end, and along the horizontal. About 9 in. of iron on the face and about 15 in. along the horizontal are sufficient. A cross should be welded into the portion attached to the face (see (*g*), Fig. 1) to prevent warping of the frame. Four window sashes, 24 in. by 24 in., are attached to this horizontal by hinges. At the rear part of each sash pieces of 3 by 1 pine are attached to serve as runners and keep this part of the sash a constant height of about 4 in. off the ground. The sashes are spaced so as to bring the centre of each sash over a bean row. The spaces between the sashes are covered by light boards fastened to one sash and overlapping the adjoining one. Drapes of American leather about 7 in. in depth are fastened to laths a few inches longer than the width of each sash, and are fixed to the rear parts of the sashes. Calico or hessian is stretched between and fastened to the horizontals (*d*) and (*f*). A loop

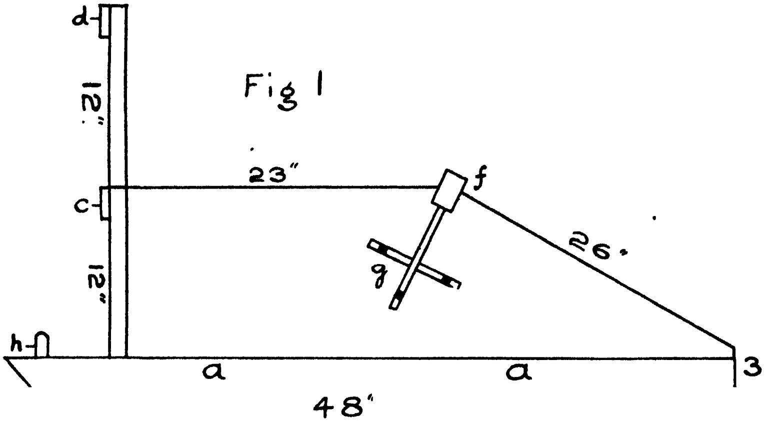


Fig 1

or staple (*h*) is made fast to each runner. A horse is hooked to the staples, and the machine is ready to use. To use, the sashes are turned back and allowed to rest on the horizontal (*d*) while they are being sprinkled with kerosene. This is the best position to have them in when transporting the machine to different parts of garden.

After sprinkling, turn the sashes down and draw the machine over the plants. A light brush placed about midway of the sashes to disturb the flies is an advantage. A light piece of bamboo branch with the branchlets on serves the purpose very well. The kerosene film evaporates quickly, and requires to be renewed, say, every five minutes; and the glass must be kept clean and clear.

A piece of hessian, with a few threads pulled out at one end and made into a roll, makes a good kerosene sprinkler.

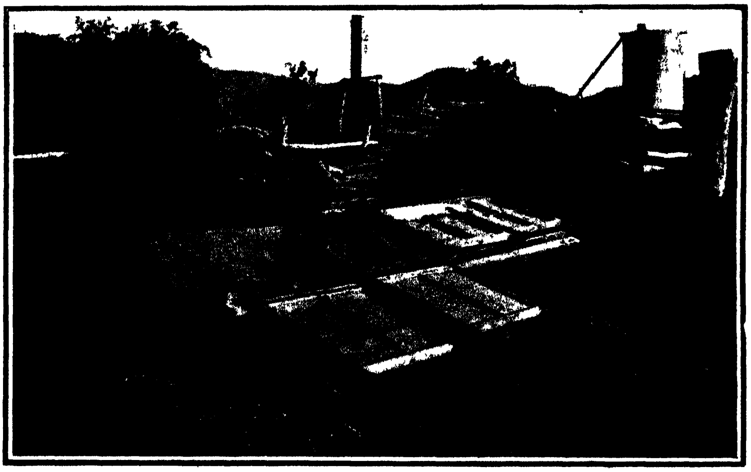


PLATE 26.—AN APPLIANCE FOR DESTROYING THE FRENCH BEAN FLY.

If the flies are very prevalent, the beans should be gone over every day for the first nine days from the time they appear. If there are only a few flies and no infected plants near, an occasional treatment whenever the flies are observed is sufficient. After the ninth day, the attacks of the fly are not very destructive, and, as the younger plants are always preferred by the flies, a crop may be protected after this stage by sowing a row of beans in the near vicinity nine or ten days after the crop is planted. The intelligent use of trap crops is a valuable adjunct, and should not be neglected.

In the machine shown in the Photo., A is 10 ft. in length overall, and covers four rows of beans 30 in. apart. Two of the sashes are shown turned back for sprinkling.

MUSHROOMS.

Mushrooms are widely distributed in this State, and large quantities may be seen growing in paddocks frequented by stock. Unfortunately, poisonous mushrooms or toadstools (the names being interchangeable) are also very plentiful; severe poisoning and even death have resulted from eating mushrooms gathered by inexperienced persons, especially young children. Some toadstools are exceedingly poisonous, but most of them are not; and some are edible. In a short article on "Mushrooms, Edible and Poisonous," by D. C. Babcock, Ohio Agricultural Experiment Station, Circular No. 153, the author says that there is no reliable test to distinguish edible and poisonous mushrooms. The common silver coin test is unreliable, as both edible and poisonous mushrooms have the same action on the coin. Another test is that, if the upper skin peels off readily, the mushroom is edible. However, poisonous toadstools can also be peeled. An agreeable flavour is also no test, as some of the poisonous mushrooms possess a very pleasing taste. More certain methods of testing fungi are by eating them (Mr. Gibson's physiological test); but, in testing out a mushroom by eating, a long drawn-out process is involved, as very small bits of the raw toadstool are swallowed, but none of the juice. This is repeated every twenty-four hours, three or four times; and if at the end no disagreeable effects are produced, one may be safe in trying a larger quantity. It must be remembered that only a very small amount of the species known as "Deadly Amanita" is required to produce serious poisoning effects. A better method is by learning from the experience of others and studying the toadstool in question and the various books written on the subject. A few rules should be adhered to:—

WHAT TO AVOID.

1. All mushrooms in the young or "button" stage. At this stage of growth, it is impossible to determine, except after long experience, some poisonous species from some edible species.

2. Avoid all those with pores on the under side of the cap, until sufficient acquaintance teaches the difference between the edible and poisonous varieties.

3. Avoid all species which have white spores, a ring, and a volva or bulb-like base together on the same specimen. The most poisonous species are in this group, which has also gills.

4. Avoid those having a milky juice, unless the milk is red.

5. Avoid those having the cap thin in comparison with the gills, especially if they are bright coloured, and in which the gills are nearly all of the same length.

6. Avoid all mushrooms which are not strictly fresh, since decay sometimes greatly increases poisonous substances. By following these

rules implicitly, one may avoid the most poisonous kinds; but the novice should experiment with the greatest caution.

The Common Meadow Mushroom (*Agaricus campestris*) has a white or drab-coloured stalk and cap. The gills (shown in the up-turned specimens in the photograph) are pinkish to brownish-purple. The stalk is rather short, cylindrical, solid, and possesses a ring around the stalk. It is never bulbous at the base, but straight and even.

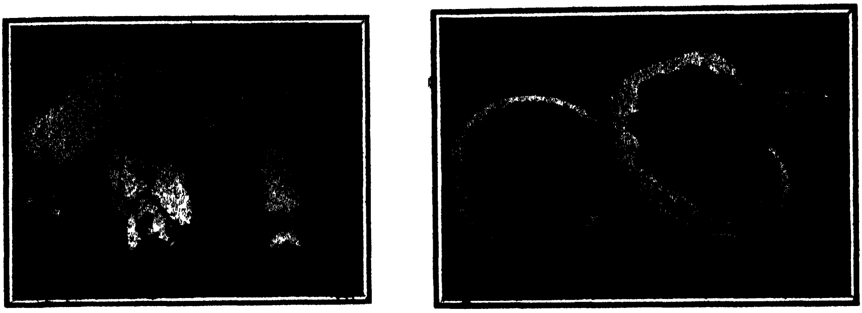


PLATE 27.—FIG. 1. COMMON MEADOW MUSHROOM, (*Agaricus campestris*). EDIBLE.

The following terms are used in identifying mushroms, and a clear definition will be appreciated by the amateur, each point being illustrated:—

VOLVA.—A membraneous sac inclosing the young mushroom of many agaricaceous fungi. It is ruptured by the expanding pileus, and remains usually as a cap at the base of the stipe. Fig. 3—V.

CAP.—The expanded, umbrella-like top of a common mushroom. Fig. 3—C.

GILLS.—Plates radiating from the stem attached to the cap on which the spores are borne. Fig. 3—G.

SPORES.—The reproductive bodies (corresponding to seeds in higher plants) of mushrooms.

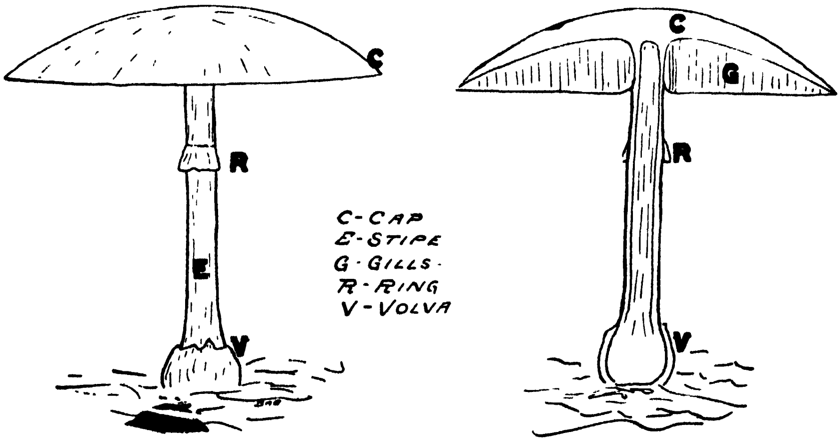


PLATE 28.—DESIGNATION OF DIFFERENT PARTS OF MUSHROOMS

RING (ANNULUS).—Part of the veil or covering adhering to the stem of agarics. Fig 3—R.

SPAWN.—The popular name for mycelium used in growing mushrooms.

STIPE.—The stalk which supports the cap. Fig. 3—E.

The usual way of preparing a mushroom bed is to collect a quantity of horse droppings and place them in a trench 1 ft. deep and 4 ft. wide, treading them down firmly. Then obtain some spawn bricks from a seed shop, break them up into pieces about the size of a boy's marble, and set them 1 ft. apart almost on the surface of the manure. Give the bed a fair sprinkling of water; and, a few days later, cover the manure and spawn with 3 in. of fine soil. Should heavy rains occur in February, it is well to provide some shelter for the bed.

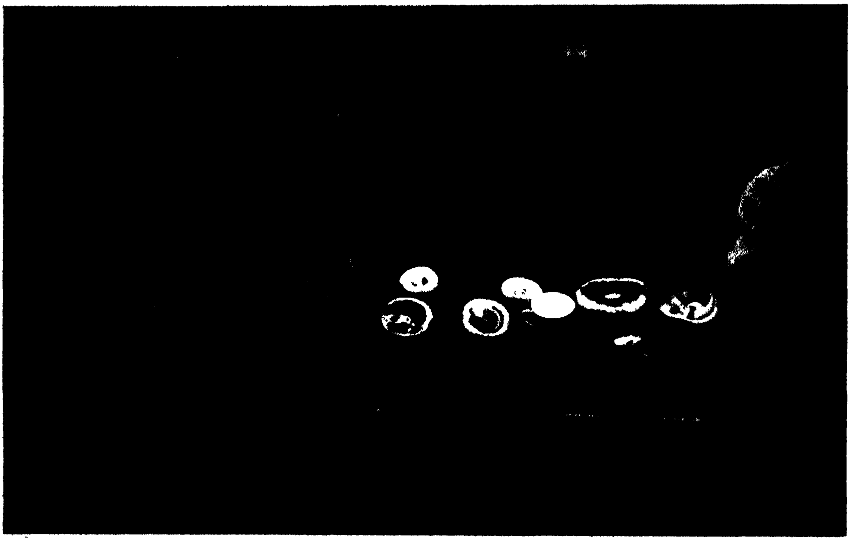


PLATE 29.—MUSHROOMS GROWN AT "HIGHLANDS," SAMFORD DISTRICT, BY MR. C. E. NICHOLS.

One of the strangest things about mushrooms is that they can be produced spontaneously, as it were, from a bed of manure. Without spawn or seed of any kind, get together a quantity of horse manure, place it in a small dark shed, tread it down firmly, and keep it moist. Very soon, on breaking part of it, small white threads will be noticed. This is the mushroom spawn. Mushrooms will spring up in abundance for about three weeks; but that exhausts the bed, and no more mushrooms will be got from it without introducing fresh spawn. Last year we made such a mushroom bed, and obtained 200 or 300 fine mushrooms from it, large numbers of them measuring from 5 to 6 in. in diameter.

The mushrooms shown in the Photograph No. 4 were grown at "Highlands," in the Samford district, by Mr. C. E. Nichols. The great size of them is shown by the foot rule and the teacup for comparison of the diameter.

EXHIBITION NOTES, 1916.

FIBROUS PLANTS AS A SOURCE OF PAPER.

Amongst the exhibits at the late Exhibition at Bowen Park was a very interesting display of aboriginal skill in basket and paper-making, shown by Mr. J. Campbell, M.A., of Gossypium Park, Kamma, near Cairns. The textile plants, mostly found growing in a wild state, have been proved by Mr. Campbell to be, if largely exploited, a most prolific source whence to derive supplies of paper for various purposes. The plants and the market values of the fibres produced from them are set forth in a short pamphlet distributed at the Textile Fibres Court, from which we take the following extracts:—

No. 1—JUTE, CHINESE BURR (TRIUMFETTA AND URENA).—A noxious weed, yet it may be made a most important industry. I was offered for the dyed fibre exhibited £35 per ton, and it costs less than £20 to produce as shown.

No. 2—ROSELLA FIBRE.—The fruit of the rosella is worth 2d. to 3d. per lb. for jam; and, when the plants are rooted up, they yield 7 per cent. of fibre as shown, and its present value is £40 per ton. An acre will yield about half a ton, so that the fruit will be nearly all profit. Here is delightful, profitable employment.

No. 3—WILD COTTON (HIBISCUS) FIBRE.—I direct special attention to this, as the raw material is very abundant from Tweed Heads to Cape York. It is fibre prepared from the wild cotton tree, a variety of Hibiscus. It is worth £20 per ton, and any willing hand can prepare 1 cwt. a day—note £1 per day! My aboriginals have made some into cord to show you its quality.

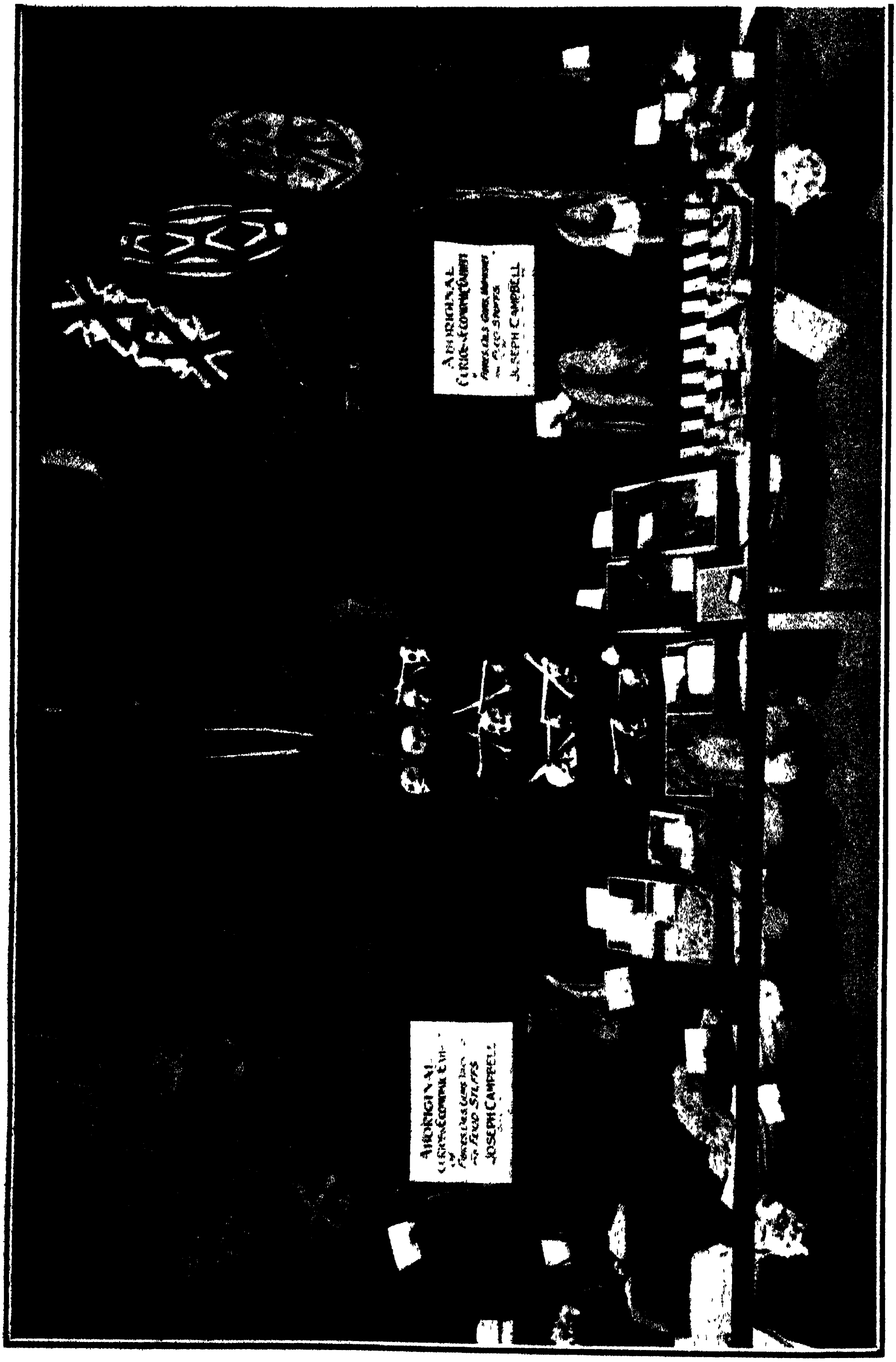
No. 4—SIDA RETUSA (CALLED THE QUEENSLAND HEMP).—When this is in season, and it grows wild in very many places, 10s. to 15s. a day can easily be earned by preparing it—using very primitive machinery which any skilled labourer can construct.

No. 5—PINEAPPLE FIBRE.—When you have enjoyed or sold the luscious fruit, you can add greatly to your garden returns by preparing this, either as fibre or paper pulp.

No. 6—PAPAW FIBRE.—From that wonderful tree, 500 of which will bring you an income of £200 to £250 a year. Read remarks below:—

"But not only do these plants produce valuable fibre; they are all convertible into high-class *Paper Pulp*, for which there is almost unlimited demand.

"*Here is Work for Hundreds.*—Carefully study my samples and these notes. The raw material is abundant, waiting for your skill. Unfortunately no one renders me any financial assistance in my investigation into North Queensland raw material, and I have to bear the cost alone; and for years have spent nearly half my private income on the work. The sad war has curtailed my income, so I cannot come and talk to you about these wonderful natural resources of


ABORIGINAL
JOSEPH CAMPBELL
ABORIGINAL
FOOD STUFFS
JOSEPH CAMPBELL

North Queensland; but if you can come to me I will gladly tell you everything. It would cost me too much to print all I have to say; but any of you, if you fit my quotation at the beginning, can make from 10s. to 20s. a day; and, if you take care of yourself, can live a healthful life up here."

Paper Pulp, No. 1.—Made from Blady grass (Lalang). It is being made in South Malay. Why should we not make it here, and live in comfort out of the proceeds? It is one of the easiest occupations in which we can engage. My houseboy, Sam, a full-blooded aboriginal, made some of the paper here exhibited. Blady grass grows wild to the extent of up to 4 tons to the acre on good land, and anybody may cut it. Four tons will produce 1½ to 2 tons of pulp, according to its dryness, and this is worth £8 per ton. It will pay well to cultivate.

No. 2—Chinese Burr Pulp.—The whole plant is converted into pulp, but if you take the fibre the balance can be made into pulp; and, as this grows wild up to 6 tons to the acre, the occupation is very profitable. Three tons will make 1 ton of pulp.

No. 3—Sida Retusa Pulp.—The foregoing remarks apply to this also. The paper is very high class, suitable for bank notes and legal documents.

No. 4—Pulp from Cane Tops, thousands of tons of which are burnt off every season, but which make excellent paper, especially blotting-paper, now so scarce. The tops are worth from 10s. to 20s. a ton delivered.

No. 5—Megass Pulp—*i.e.*, the refuse cane as it comes through the rollers. This is burnt as fuel, but makes capital paper, as you will see by the samples. Megass is worth about 12s. 6d. to 15s. a ton delivered. As fuel it is worth 5s.

No. 6—Banana Pulp.—Bananas are a profitable crop to grow, even at 2s. a bunch; but when the plant has borne its fruit, the whole of it can be manufactured into paper pulp. The paper is of very high quality. It takes 5 tons of banana stems and leaves to make 1 ton of pulp, which is worth £10. Hence the work is very profitable.

No. 7—Pineapple Pulp.—What I have said about the banana, applies to pineapples.

No. 8—Pandanus Pulp.—While working at the pineapple, my aboriginal servant Sam said: "Boss, that one wild pineapple, that grow along swamp where cut firewood all same as this. He make him paper too." "Well done, Sam," said I, "go and get some at once." He did so, and in six hours it was converted into the sample of paper exhibited. I rewarded Sam with 2s. for his thoughtfulness, tapping his skull and saying, "Well, Sam, this one, meaning brain, earn that money for you—not your hands this time, but your head. I did not think of that plant. Well done, Sam." This material is very abundant in places, and a rough portable plant can be erected by willing workers on such spots. It yields one-fifth of its green weight of high-class pulp as per sample exhibited.

No. 9—WILD COTTON (HIBISCUS) PULP.—This yields excellent fibre, as I have said, but more than this: The whole plant can be converted into excellent pulp, and the two operations, fibre and pulp making therefrom, easily spell "quick returns, good wages, and happy out-door life." Start the work at once. The raw material is most abundant.

No. 10—BAMBOO PULP.—Excellent, and in some tropical regions the industry is carried on; but we have so many other plants already waiting for our skill and labour that this can be passed over, excepting where they happen to be growing.

No. 11—COTTON.—In connection with the cotton (Caravonica) exhibit, Mr. Campbell very truly says:—"The need is great. After the war we trust there will be a revival of normal trade, and, as the surplus supplies of cotton are now considerably reduced, there will be a serious cotton famine if we do not arouse interest in the development of new cotton fields. The whole coast is suitable for the cultivation of this cotton. The exhibit shows what can be done in North Queensland. It is worth 1d. per lb. to pick, and a man can pick from 100 to 150 lb. a day. The lint—*i.e.*, ginned cotton—is worth 9½d. in Liverpool. Notice the garments and surgical wool—the best in the world."

HOME-CURING HAMS AND BACON.

"FARMER'S WIFE," Toowoomba—

We have given several recipes for curing hams and bacon in the Journal. Here is one, recommended in the "Farm Journal," Sydney:—

"The cause of hardness in bacon referred to is due to the excessive use of saltpetre, especially through using it during the first stages of curing. For home curing a suitable recipe is as follows:—Weigh out for each 100 lb. of meat 5 lb. of salt, 2 lb. of brown sugar, and 2 oz. of saltpetre. When the carcass is thoroughly set, cut up and salt lightly; then lay it overnight upon a clean concrete floor or table. By salting lightly is meant that as much salt as will cover the meat comfortably without undue waste be used. Next morning brush the salt off thoroughly; then dry-salt the meat with dry salt and brown sugar, rubbed well in daily for three days. On the fourth and fifth days a little saltpetre should be added to the salt and sugar, which should be well rubbed in, especially on the skin. Leave the bacon and hams in the mixture (dry salt and brown sugar) for about three weeks; but they should be turned every day or second day; at the same time continue rubbing during this period. Then wash clean, when the bacon and hams will be ready for smoking, the duration of which depends upon the taste of the manufacturer. After the first week or ten days, it is advisable to brush the salt and sugar off the inner side of the thin parts of the bacon (flaps). Note that dry salting should only be undertaken in cold weather and in a cool place."

Pastoral.

THE EXPERIMENTAL FEEDING OF CATTLE WITH PRICKLY-PEAR.

By FRANK SMITH, B.Sc., F.I.C.
(In charge of Prickly-pear Feeding Investigation, Wallumbilla.)

Primarily, the objective of the work of the Prickly-pear Feeding Station at Wallumbilla is to ascertain the truth concerning prickly-pear in regard to its utility as a stock food; secondarily, the nature of and limitations to its utility being established, to discover a system of feeding it that will give the best results in practice; and, thirdly, to investigate and to demonstrate the results accruing when it is rationally employed as a component of rations both for the maintenance of herds, for fattening purposes, for milk production, and for the raising of young stock.

The benefit that would result from the proving of pear a fodder of any considerable economic value, especially in the direction of assisting the more profitable occupation of pear-infested lands, is manifest. It is here emphasised, however, that experimental stock-feeding has not been undertaken on the *à priori* assumption that as an edible plant prickly-pear possesses special merit, or with the avowed object of demonstrating such, but with recognition of the fact that it can play a part in the nurture of grazing or farm-fed animals with results only in accordance with the established laws governing nutrition. Thus, it is impossible that pear possesses a value to the animal exceeding that of the nutriment it affords except that it furnishes water or may prove beneficial on account of its succulence. On the other hand, from its peculiar nature it may, when largely consumed, prove detrimental to animals partaking of it, and operate prejudicially upon the processes of fattening or growth, or detrimentally upon milk yield or the quality of the product. It is the aim of the present experimental feeding to establish the amount of nutriment provided by pear when fed to satisfaction of natural appetite or of appetite induced by artificial treatment, and to observe both the physiological and productive effect of pear rations.

The investigation has bearing both on the question of natural grazing on pear and its utilisation for farm-fed stock, inquiring, on the one hand, into impressions current among stockmen as to the grazing value of pear areas and the contribution of pear thereto; and, on the other, indicating the class and quantity of additional feeds with which it is necessary to supplement it in the adequate maintenance of stock and for productive farm-feeding, as well as the most economical and effective method of administering.

NATURAL PEAR GRAZING.

Summarised, in the relation of prickly-pear to natural grazing, it is anticipated that the solution of the following problems may be contributed to:—

(*a*) The comparative nutritive value and palatability of scrub and forest grown pear.

(*b*) The possible superiority in nutritive value and palatability of "varieties" of pear for which cattle appear to show preference.

(*c*) The amount of pear likely to be consumed by grazing stock.

(*d*) The effect of partaking of water by pear-fed animals.

(*e*) The possible contribution of pear to the sustenance of grazing stock alone or in conjunction with other herbage.

(*f*) The value of and contribution to fattening on pear areas of edible shrubs.

THE MAINTENANCE AND PRODUCTIVE FEEDING OF FARM STOCK.

During protracted drought and failure of pastures the possibility of preservation of herds by utilisation of prickly-pear as fodder becomes an actual problem. How far may pear contribute thereto, and how may its insufficiency be most adequately met? In the event of the impossibility of economically constituting pear a main constituent in productive rations, its function in maintenance may yet be shown to be considerable.

From the point of view of the herdsman, the subject of maintenance—in this relation the preservation of bodily condition in animals without increase of body tissue or provision for milk production—is of some importance as forming a basis for elaboration of rations designed for fattening or milking herds. In relation to the general question of feeding of farm cattle, the points following are under investigation:—

(*a*) The best method of preparing pear for feeding purposes, considering innocuity, palatability, and economy.

(*b*) The comparative values of scrub and forest pear for hand-fed stock.

(*c*) The demand of pear-fed animals for water.

(*d*) The physiological effect of high pear rations.

(*e*) The effectiveness of pear alone or with other feeds for maintenance of condition.

(*f*) The value of prickly-pear in rations designed for the fattening of mature stock.

PRICKLY-PEAR IN RATIONS OF MILKING HERDS.

It is proposed during 1917 to conduct experimental feeding of prickly-pear to milch cows. The general questions relating to hand-feeding at present under investigation will have direct bearing on this phase of economic pear utilisation. It is designed to test the comparative values of prickly-pear and other forms of roughage as a base in milking rations in regard both to the quantity and quality of the product; in other words, to trace the effect of substitution of pear for such ordinary farm foods as it can wholly or in part replace in rations providing for maximum production. This is the fundamental problem with bearing on the possibility of economically using pear in the sustenance of milking herds, and a system of comparative feeding will afford a concrete basis for the evaluation of the plant. It may be pointed out that the findings of recent work on these lines in the United States, to which certain publicity has been given in Queensland, may not, in the opinion of the writer, be found to hold under local conditions—first, on account of the apparent abnormality of the animals employed; secondly, on account of the utilisation therein of considerable quantities of grain, a practice not customary locally; and, thirdly, and perhaps most important, because the varieties of pear used were not the prevalent *Opuntia inermis* of Western Queensland.

The third condition, indeed, apart from the fact that various pronouncements upon the value of prickly-pear as stock food elsewhere have not in all cases been based on sufficiently controlled experimentation, constitutes the chief reason for the institution of inquiry as a whole in Queensland. It is manifestly impossible to expect results favourable to the use of prickly-pear when it is constituted a portion of rations insufficient in total quantity or deficient in certain essential nutriment.

An extension of the dairy-herd work may well embrace observation of the effect of long-continued pear-feeding upon the progeny, and trial of prickly-pear as a constituent in the dietary of calves and growing stock.

EQUIPMENT AND METHODS.

Feeding operations are being conducted at a site abutting on the main Western line, 1 mile on the Roma side of Wallumbilla, and so situated as to make available pear both from box and sandalwood forest and brigalow and belah scrub.

The main buildings consist of a feed-preparation shed and a feeding-shed connected by means of a trolley-way for the ready conveyance of fodder to the feed-boxes. The equipment of the feed-preparation shed consists of appropriate scales for apportionment of rations and an engine-driven pear-cutter.

The experimental animals are stall-fed, and the rations weighed, for, since prickly-pear is on trial as a feed and component of stock rations, it is essential to accurately ascertain the amounts consumed both of pear and other feedstuffs given.

In their relation to problems pertaining to the natural grazing of pear it is considered that the data secured in stall-feeding are applicable; while the method constitutes actual trial of pear in rations for hand-fed stock. It is not, however, primarily sought to demonstrate that stall-feeding is possible at a profit for the class of cattle at present on the Station, although at the outset it did not appear impossible that under certain conditions the utilisation of pear as the main constituent of stall-fed fattening rations might not prove economically feasible—the principal condition being the provision of the major portion of the nutriment by inducement of sufficiently high pear consumption.

The cattle at present under experimental treatment consist of 18 head of young bullocks or mature steers purchased in open market, and not noted for any special capability as pear-eaters. Consisting, as it is thought, of a good average class of beef stock, the data secured with bearing on the edible and nutritive properties of pear obtained with them should be of general applicability.

Progress of animals under each system of feeding is recorded by daily weighing and observation of such signs of welfare or depreciation as become apparent.

A small laboratory building—in which the work of chemical control of rations and investigation of composition of edible shrubs is being carried out—is situated on the cultivation paddock set aside from the Police Department reservation and adjoining the Wallumbilla water reserve. Adjacent is a watering-shed in which are installed a series of graduated drinking troughs, supplied by an overhead tank, for the estimate of water requirement and inquiry into questions related thereto, the water supply, also, being designed to meet the needs of the dairying operations in 1917.

Provision is also being made for the ensuing dairy work in the storage of ensilage and growing of hay crops.

The Station is, however, not intended for the demonstration of agricultural methods. Nor is it pretended that the minutiæ of the stall-feeding adopted are entirely suitable to ordinary farm practice. For the purpose of investigation, however, the exact weighing of rations is essential and the methods of handling most convenient. With the establishment and demonstration of correct principles in pear-feeding, the adoption to ordinary practice can be made to suit individual circumstances; to which, generally, the recommendations subsequently made as to treating pear for hand-fed stock, considering economy and convenience, will apply.

The additional feeds employed must be taken as representative of classes rather than as in all cases most recommendable or convenient of employment. Thus, the linseed meal or cocoanut cake in use are typical of the class of concentrated foods; lucerne hay of leguminous hays; wheaten hay of non-leguminous hays or roughages of general utility. The question as to whether better results will be obtained with one concentrate or the other, or of one legume or the other, involves rather comparison of the merits of individual adjunct feeds than the question of the general utility of pear.

The important problem of how, in the face of often adverse climatic conditions, feeding-stuffs adequate to the effective economic utilisation of pear cattle rations can be farm-grown is a branch of inquiry that might usefully follow the present investigation.

THE PRICKLY-PEAR STOCK FEEDING EXPERIMENT STATION, WALLUMBILLA.

The Director of Agriculture, Mr. H. C. Quodling, paid a visit on the 28th instant to the Prickly-pear Stock Feeding Experiment Station at Wallumbilla, and states that the work of the chemist in charge, Mr. F. Smith, B.Sc., has been advanced sufficiently to enable certain deductions to be made in regard to the pear consumption of animals and the effect of pear diet alone, and in conjunction with minor quantities of supplementary foods.

It was decided in the first instance when the Department initiated the experiments to attempt to establish certain data on which the successive work of the Station would be based, and for this purpose an average lot of young bullocks were taken and divided accordingly into groups, the contention being that this class of stock would not be influenced to the same degree that female or dairy stock would be, by functional derangement, different periods of lactation, &c.

Eighteen animals are being dealt with, and, excepting the small group which was kept exclusively on a pear diet until it was proven that they began to waste, the remainder have settled down to their altered circumstances and show a thriftiness and contentment consistent with individual temperament and ability to feed.

Several animals when taken in hand at first were wild and untractable for a few weeks and would not eat, which resulted in individual losses of from 150 to 200 lb. live weight; however, this has given place now to an ordered routine in which the animals occupy their own set of feeding stalls, and, when let out again, await their turn at the weighbridge prior to being put out into a small bare paddock, where they camp contentedly under the shade of the trees until brought or called up again for their next meal.

The experimental work has so far dealt with the utility of pear in maintaining condition in animals, without unnecessarily producing increase. This is a problem with which numerous cattle men would have been satisfied to have secured a cheap and satisfactory solution of during the recent disastrous drought.

Owing to the recent seasonable improvement, the pear is undoubtedly more succulent and possibly more acceptable to cattle than it was. Boiling or roasting is usually adopted by users of pear to soften the spines and render them innocuous, but at the Stock Feeding Station no previous preparation has so far been given to the pear, which is simply put through a slicer, similar in character to a pumpkin or turnip slicer, and this process reduces it to a form in which it is readily consumed without, so far, any deleterious effects. One thing of which notice must be taken is the fact that in the comparative maintenance trials, the group of animals fed solely on picked scrub-pear were unable to maintain themselves for more than a very limited period before commencing to show a rapid loss in weight and evidence of deficient nutrition in stariness of coat and appearance and general unthriftiness.

The ability of succulent pear to provide sufficient water, at least in the cooler portion of the year, has been demonstrated in the present experiments by the fact that the bullocks have not had any water for four months, and still show thrifty condition and no noticeable desire to look for water; this may be explained by the fact that animals receiving a minimum amount of pear are provided through that medium with an amount of water equal to from 4 to 4½ gallons per day. The inability of animals to exist on pear alone has been referred to. On the other hand, the use of minimum amounts of ordinary hays with pear has maintained weight, but resulted in a noticeable depreciation in appearance when compared with animals receiving additional food in the form of small amounts of leguminous (lucerne) hays and relatively small amounts of oil-cake concentrates, both of which tend to supply the food constituents in which the pear has been proved by analyses, conducted at the laboratory at the Station, to be deficient.

The estimated first cost for nutrients only to be added to a pear diet, simply prepared as it is done at present at the Station, works out at a little more than 2d. per head per day. Now that certain facts in connection with the preliminary trials have been so far proven, it is purposed to try and adapt the knowledge so gained, and put it to practical test, by giving small quantities and kinds of concentrate (so-called supplementary licks) to animals, which will be allowed access to pear under natural grazing conditions; due regard being given, of course, to the proper control and recording of the experiments.

The advantage of combining science and practice in this branch of experiment work is fully recognised, and the recording and summarising of the results for presentation to the public in an acceptable form are now occupying the attention of the Officer in Charge of the Station.

The cultivation and conservation of hay and ensilage crops for present and future use have been taken up. About 20 tons of silage—made from maize, sorghum, and Soudan grass—has already been conserved. Another 10 tons of fodder—barley and wheat—are now ready for the silo. A supply of ensilage will be needed in the near future when the dairying operations, the corollary of the present experiments, are commenced.

FOOTROT IN SHEEP.

By "CROWFOOT."

The disease known as footrot in sheep is of two kinds, contagious and non-contagious; the one contains a germ or parasite, capable of being transmitted by inoculation, and the other is so similar to it that it is often taken for the more virulent type. Non-contagious footrot, known as "dewscald," "fouls," &c., usually commences in or near the little gland or sack at the front of the foot and just between the digits; it contains the lubricant that keeps the digit space from becoming hard and liable to crack, but in wet seasons it gets clogged up with mud and herbage, and as the sheep's feet are continuously wet through not coming in contact with the soil, the hoofs grow rapidly through having nothing hard to keep them worn down. Consequently they collect and hold much foreign matter, which ferments and causes intense ulceration, which if left alone spreads up under the hoof and affects the laminae of the foot. Pellets of mud also getting between the clefts of the foot, kneaded by the action of the hoofs in walking, and held there by the fine, short hair in the cleft, also produce a lameness resembling non-contagious footrot. It is cured by removing the pellet.

The pellet lameness occurs chiefly on Myall land, where the soil is very clinging in its nature, but this lameness does not constitute true footrot. The non-contagious variety cannot develop into the contagious any more than measles can develop into smallpox. "Dewscald" is caused by keeping sheep in wet, filthy yards or sheds, and on low undrained land. A wet season and tall, rank grass often produce it, especially if the hoofs are not kept closely trimmed so as to allow the free circulation of air between the cleft.

In the contagious variety the ailment spreads most rapidly during moist warm weather, such as we get during the spring; if it gets a good hold of many feet in such weather it is impossible to effect a cure, because the parasite multiplies so rapidly, and is so easily communicated. It can only be held in check until such time as the weather or season of the year will materially aid in effecting a cure. It also starts differently to the milder form, the starting place being the fringe of the hoof and usually towards the front of the digits, and spreads under the hoof up to the point of the toe, and along the side towards the heel; the hoof rises and eventually sloughs off. The coronet is the first start, similar to that recent disease known in America as horse footrot and gangrenous dermatitis. I have proved its contagion by slightly scratching the skin just where hair and hoof meet, sufficient to bring blood, and then rubbing some of the virus that exudes from a badly-affected foot on the wound. In three or four days, if weather conditions are favourable, you get the true thing, whereas with dewscald you get no result beyond a slight fomentation at the point of contact, which heals up rapidly.

Assuming footrot of any description to be contagious, it is always necessary as a first step to separate the diseased from the healthy sheep, or otherwise the whole flock may take it; this is very often the case, for as far as I can see only a very few flockowners take the precaution. Footrotty sheep should never be allowed to go on to sound country until thoroughly cured; some sheep are incurable, and it saves time and money to cut their throats and burn them. Again some sheep in a flock are immune, and, as a great deal lies in the formation of the foot, when culling this should be taken into account in country liable to be affected. A great deal depends on the kind of season, but once the disease gets amongst a flock it is much harder to cure than scab. Animals kept in a healty condition do not take it so readily as animals whose blood is in a bad state. A hospital paddock is very necessary, as it enables owners to isolate the disease, and the affected sheep can be worked at without disturbing the sound ones.

Once contagious footrot gets a good hold in a flock, it requires a great deal of care and patience to get rid of it, and unless adjoining owners are equally careful it will be labour in vain. It takes about seven days to develop, and death takes place from starvation before it runs its course, as the sheep if attacked in all four feet cannot get about to feed if there is no attempt made to cure it. Footrot usually starts as an epidemic, but it must have warmth, moisture, and rank herbage. If these conditions are absent, we have little or no footrot.

With regard to treatment, first of all isolation is necessary, then dressing of the feet, if it is only a case of simple footscald. This can be done quickly by taking off all the overgrown and loose portions of the hoof with a sharp knife or secateurs, and then running the sheep through a trough containing well-mixed bluestone water or arsenic (the former for preference) at a temperature of 90 degrees, placing a little clean straw or wool in the trough to prevent splashing. For the more virulent cases hand dressing has to be done, and this is where the skill is required. All the ulcerated parts must be entirely denuded of hoof, without making the feet bleed too freely, and keeping them as near the natural shape as possible. The next process is either to cauterise or to cut off with a sharp pair of surgical scissors or a knife any considerable fungus growth.

Now what is the best cure? Well, I have found nothing simple or compound (and I believe I have used nearly every possible dressing a chemist's shop contains) to equal sulphate of copper or bluestone. Use a solution of this, say 8 oz. of bluestone to 1 gallon of water, made as hot as a sheep can stand in with comfort, and place it in a shallow tub or trough capable of holding say about four sheep. When four have been put in the tub take out the first, the feet by this method getting thoroughly saturated, then let them stand on a dry, clean floor for twelve hours before turning out. The sheep must be looked to as often as once in three days, in order that any bad cases can be washed and redressed, and so the cure will be effected. Once a sheep is thoroughly cured, every succeeding attack is less severe, should such occur again. Another advantage in the use of bluestone is that it nullifies the matter or virus which exudes from a diseased foot. A great many owners pin their faith to arsenic as a medicament, but I can only say, after very many years' experience of this disease, that arsenic only temporarily allays the complaint by creating a dry crust over the sore, with the result that in a week or two the sheep are as bad as ever. The instruments used must be constantly sterilised and kept thoroughly clean, or blood-poisoning will result. Also the knives must be kept very sharp, good work being impossible with a blunt knife.

For hand dressing a few bad cases, a good salve can be made as follows:—1½ oz. of aqua fortis, ¼ lb. bluestone, 1 oz. friar's balsam, one-third as much alum or salt as bluestone (alum best), and as much mutton fat or lard as is necessary to make a salve soft enough for application. Powder the bluestone and alum very fine, mix thoroughly, then add the aqua fortis. Mix until it becomes a paste, then add the friar's balsam, and afterwards the fat. The cure greatly depends on the paring, as every part of the rot must be exposed for the salve to act upon. Where it is necessary to treat 1,000 head of sheep by hand, the great temptation is to turn an army of men into the operating theatre, armed with everything except the necessary skill to do the work efficiently, in order to get the work over quickly. I have repeatedly seen this kind of performance, with the result that 50 per cent. of the poor sheep have left the hands of the operators permanently maimed. Every toe vein cut means bumble foot, and in many cases necrosis of coronet.

Footrot is a wearying ailment to deal with, owing to the tediousness of the healing process, and it is also expensive if many sheep have to be dealt with. The operator must always be comfortably seated, so as to have a steady hand, and to give the patient a comfortable posture, in order that they may not be so liable to kick; efficient work cannot be done with the back bent in standing up. The way to hold a sheep, when seated, is to let the animal rest in the fork, with the left leg of the operator between the hind legs of the sheep, resting the foot firmly on the ground. This prevents struggling. Next take a firm hold of the hind foot on one side and treat that, and then deal likewise with the other. While the hind feet are being dressed, tuck the forelegs under the left arm, letting the arm from the shoulder to about the elbow rest slant-wise across the brisket in the way a shearer does when taking off the belly wool. This saves the operator from getting cuts, and allows him to fix his whole attention on the feet. The hind feet should always be done first, to save blood getting on to one's clothes. When the fore feet come to be done hold the patient in a less perpendicular position so as to bring the hand action well above the feet, and one leg can be left under the arm. After the whole four feet have been gone over, the sheep should be handed to the dresser. The operator must neither have to catch his sheep nor let it go; the catcher fills both offices. The reason for this is that capturing the sheep and turning it into the required position creates an unsteady hand, and a great thing in the paring of the diseased hoof is a sharp knife and a steady hand and wrist.—"Pastoral Review."

SHEEP ON THE COAST.

If any proof were wanted that sheep-breeding on the coast is a successful and paying business, and one eminently adapted for returned soldiers who intend going on the land, it is afforded by the experience of Mr. Munro Hull, Eumundi, who lately took up sheep-raising on his property. From his small initiatory flock of the crossbred Romney Marsh —as always advised for the coast districts by Mr. W. G. Brown, Instructor in Sheep and Wool—Mr. Hull obtained his first bale of wool, which was sold by Messrs. Dalgety and Co., the price obtained being 18¾d. This (Mr. Hull says) works out at 13s. for old sheep and 6s. for the lambs. Mr. Hull is so satisfied with this promising commencement that he is purchasing more sheep. Mr. Brown is of the opinion that sheep-raising on the coast is the very thing to give a more than good living to returned soldiers, who, however inexperienced, would quickly learn the business, having all the assistance of the experts of the Department of Agriculture and Stock to lead them to success.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

Milking Returns of Cows for Month of August, 1916.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Queen Kate	Ayrshire	15 June, 1916	1,087	4·0	51·05	
Nina	Shorthorn	24 June ,,	1,144	3·6	48·27	
Bluebelle	Jersey	22 June ,,	881	4·6	47·74	
Lowla II.	Shorth'rn-Ayrshire	6 July ,,	974	3·8	43·38	
Rosine	Ayrshire	5 July ,,	864	4·2	42·65	
Auntie's Lass	,,	4 April ,,	759	4·6	41·12	
Thornton Fair tta	Jersey	26 May ,,	692	5·0	40·83	
Lady Melba	Holstein	28 Oct., 1915	935	3·6	39·45	
Princess Kate	Ayrshire	21 June, 1916	832	4·0	39·08	
Iron Plate	Jersey	20 Jan. ,,	581	5·3	36·39	
Lady Loch II.	Ayrshire	17 Mar. ,,	682	4·4	35·32	
Cocoatina	Jersey	17 Mar. ,,	549	5·0	32·40	
Miss Belle	,,	1 Aug. ,,	483	5·6	31·99	
Constancy	Ayrshire	24 Nov., 1915	530	5·0	31·28	
Belinda	,,	27 Feb., 1916	678	3·9	31·02	
Lady Maid	Shorthorn	26 Jan. ,,	641	4·0	30·09	
Mistress Bee	Jersey	21 Jan. ,,	502	5·0	29·62	
Twylish's Maid	,,	22 Oct., 1915	472	5·2	28·99	
Netherton Belle	Ayrshire	23 April, 1916	491	5·0	28·96	
Lady Margaret	,,	14 Oct., 1915	550	4·3	27·83	
Miss Mischief	,,	15 June, 1916	527	4·4	27·29	
Charity	Jersey	28 May ,,	497	4·6	26·92	
Lady Lark	Ayrshire	24 June ,,	545	4·2	26·90	
Lady Spec.	,,	6 Jan. ,,	550	4·0	25·83	
Red Lark	,,	21 June ,,	537	3·9	24·58	
Violette's Peer's Girl	Jersey	8 Dec., 1915	340	6·0	24·16	
Jennie	Ayrshire	1 Nov. ,,	464	4·2	22·89	
Jess of Greystanes	,,	18 Oct. ,,	499	3·9	22·83	
Lady Mitchell	Holstein	3 June, 1916	503	3·8	22·41	
Lerida II.	Ayrshire	12 June ,,	446	4·0	20·93	
La Hurette Hope	Jersey	17 Nov., 1915	305	5·6	20·20	

During the early part of the month the cows were fed on maize silage, but during the latter part of the month they were grazed on cultivated areas.

THE CHAMPION COW OF DENMARK.

A correspondent sends us the following:—"The event of the year in Denmark—that is, in a similar sense to the Melbourne Cup of Australia—is the announcement of the winner of the championship of the dairy cows. The data of the entrants are kept from 1st July to the following 30th June. The cows which are entered are placed at one of the large agricultural colleges for a whole year. Last year's champion produced 15,071½ lb. of milk, from which 880 lb. of butter were made. The average value of butter being about 1s. 6d. per lb., the income from this cow for the year was £66. She is indeed a champion dairy cow.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, AUGUST, 1916.

Nine thousand nine hundred and thirty-four eggs were laid during the month, an average of 136 per pen. Cowan Bros. win the monthly prize with 157 eggs. The following are the individual records:—

Competitors.	Breed.	August.	Total.
*T. Fanning	White Leghorns	133	603
*J. Zahl	Do.	143	587
*Mrs. J. Jobling, N.S.W.	Black Orpingtons	140	566
A. Howe, N.S.W.	White Leghorns	149	560
*Miss Hinze	Do.	152	554
*A. T. Coomber	Do.	146	548
G. H. Turner	Do.	146	535
*J. M. Manson	Do.	151	528
Dr. Jennings	Do.	149	525
*Dixie Egg Plant	Do.	130	524
W. Meneely	Do.	145	516
Geo. Tomlinson	Do.	143	497
T. B. Hawkins	Do.	137	496
J. R. Wilson	Do.	150	494
J. M. Manson	Black Orpingtons	145	482
*A. E. Walters	White Leghorns	145	479
*E. A. Smith	Do.	141	478
*J. F. Dalrymple, N.S.W.	Rhode Island Reds	150	476
W. Lyell	White Leghorns	134	472
*E. F. Dennis	Do.	141	471
S. B. Tutin	Do.	134	469
Geo. Prince	Do.	131	467
A. W. Bailey	Do.	130	457
Mrs. Bradburne, N.S.W.	Do.	147	456
Mrs. Munro	Do.	137	454
T. E. Jarman, N.S.W.	Do.	137	454
Cowan Bros., N.S.W.	Black Orpingtons	157	452
H. W. Broad	White Leghorns	147	450
T. Taylor	Do.	140	450
H. Jobling, N.S.W.	Black Orpingtons	137	449
A. F. Camkin, N.S.W.	White Leghorns	133	441
Kelvin Poultry Farm	Do.	147	439
R. Burns	S. L. Wyandottes	147	436
*J. H. Gill, Victoria	White Leghorns	140	436
*C. Knoblauch	Do.	133	436
*W. L. Forrest, N.S.W.	Do.	128	431
C. P. Buchanan	Do.	119	430
*Kelvin Poultry Farm	Do.	126	427
Mrs. C. Davis	Do.	128	425
F. Clayton, N.S.W.	Do.	132	424
*J. Anderson, Victoria	Red Sussex	119	422
*E. West	White Leghorns	126	421
P. Brodie	Do.	124	417
A. H. Padman, S.A.	Do.	133	416
*W. H. Knowles, junr.	Do.	141	411

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	August.	Total.
Mars Poultry Farm	White Leghorns	132	410
J. Gosley	Do.	122	407
King and Watson, N.S.W.	Do.	141	398
*J. H. Madrers	Rhode Island Reds	132	396
T. Fanning	Black Orpingtons	128	385
E. Pocock	White Leghorns	129	385
W. Purvis, S.A.	Do.	146	383
J. Anderson, Victoria	Do.	132	383
W. Hirst, N.S.W.	Do.	142	383
E. F. Dennis	Black Orpingtons	155	381
R. Burns	Do.	132	380
*J. W. Macrae	Do.	144	375
W. H. Forsyth	Do.	117	363
F. Clayton	Rhode Island Reds	132	363
J. G. Richter	White Leghorns	141	359
W. Becker	Do.	146	357
Cowan Bros., N.S.W.	Do.	144	356
Mars Poultry Farm	Black Orpingtons	148	330
G. W. Holland	White Leghorns	117	319
L. K. Pettit, N.S.W.	Do.	114	300
Harveston Poultry Farm	Do.	133	290
F. W. Leney	Do.	136	277
W. Lindus, N.S.W.	Do.	115	261
H. Hammill, N.S.W.	Do.	127	257
A. T. Coomber	Sicilian Buttercups	112	253
Moritz Bros., S.A.	White Leghorns	136	240
F. W Leney	Rhode Island Reds	131	223
E. F. Dennis	White Wyandottes	104	210
Totals	...	9.934	30,785

* Indicates that birds are competing in single hen test.

RETURNS FROM SINGLE TEST PENS.

Competitors.	A.	B.	C	D.	E.	F.	Total.
T. Fanning	104	110	108	107	94	80	603
J. Zahl	93	97	106	90	102	99	587
Mrs. J. Jobling	110	120	69	97	74	96	566
Miss Hinze	96	79	112	84	94	89	554
A. T. Coomber	100	104	95	74	83	92	548
J. M. Manson	72	113	82	81	103	77	528
Dixie Egg Plant	122	108	103	97	0	94	524
A. E. Walters	86	111	74	62	93	53	479
E. A. Smith	104	80	74	101	57	62	478
J. F. Dalrymple	81	65	104	46	89	91	476
E. F. Dennis	75	104	53	92	80	67	471
J. H. Gill	45	95	52	103	69	72	436
C. Knoblauch	81	72	61	60	80	82	436
W. F. Forrest	77	80	43	91	82	58	431
Kelvin Poultry Farm	68	57	78	53	95	76	427
J. Anderson	91	61	95	18	95	62	422
K. West	100	85	52	58	53	73	421
W. H. Knowles	76	58	74	52	75	76	411
J. H. Madrers	46	84	80	87	60	39	396
J. W. Macrae	35	98	82	53	46	61	375

WEIGHT OF EGGS, SINGLE HEN TEST. (Oz.)

Competitors.	Breed.	A.	B.	C.	D.	E.	F.	Average.
J. Zahl	W. Leghorns	2·15	2·15	2·00	2·05	2·00	1·90	2·04
Dixie Egg Plant ...	Do. ...	1·95	1·95	2·05	1·95	...	2·05	1·99
J. H. Madrers ...	R. I. Reds ...	2·00	2·10	1·90	2·30	2·05	2·35	2·12
A. E. Walters ...	W. Leghorns	2·05	2·00	2·20	1·95	1·95	2·05	2·03
W. H. Knowles ..	Do. ...	2·05	1·90	2·05	2·00	1·85	2·15	2·00
Mrs. J. Jobling ...	B. Orpingtons	1·90	1·95	2·15	2·00	1·95	1·85	1·93
C. Knoblauch ...	W. Leghorns	2·10	1·95	2·05	1·90	1·90	1·95	1·98
J. F. Dalrymple ...	R. I. Reds ...	2·00	2·20	2·00	2·25	2·25	2·25	2·16
J. M. Manson ...	W. Leghorns	2·10	2·20	2·30	2·25	2·25	2·00	2·18
Miss Hinze	Do. ...	2·05	2·30	2·25	2·00	2·10	2·05	2·13
E. F. Dennis ...	Do. ...	2·15	2·10	2·35	1·90	2·10	2·25	2·14
Kelvin Poultry Farm	Do. ...	2·00	1·80	2·05	2·20	1·90	2·10	2·01
E. A. Smith	Do. ...	2·00	2·05	2·25	2·15	2·30	2·05	2·13
J. W. Macrae ...	B. Orpingtons	2·05	1·60	1·95	2·10	2·00	2·00	1·95
T. Fanning	W. Leghorns	2·05	2·10	2·05	2·05	2·00	1·95	2·05
J. H. Gill	Do. ...	2·05	1·90	2·10	1·95	1·80	2·00	1·97
J. Anderson	Red Sussex ...	1·95	2·05	2·00	2·00	1·60	2·00	1·93
A. T. Coomber ..	W. Leghorns	2·05	2·10	1·95	1·95	2·20	2·05	2·05
E. West	Do. ..	2·00	2·25	2·20	2·00	2·00	2·40	2·14
W. L. Forrest ...	Do. ...	2·05	2·10	2·35	1·95	2·15	1·95	2·09

In all cases three or more eggs of each hen were weighed.

RESULTS OF WEIGHING EGGS FROM SIX HEN PENS.

Competitors.	Breed	Average Weight per Egg	Competitors.	Breed.	Average Weight per Egg
		Oz			Oz.
A. T. Coomber ...	S. Buttercups	2·10	H. Hammill ...	W. Leghorns	2·00
P. Brodie	W. Leghorns	2·00	W. Lindus ...	Do. ...	2·00
S. B. Tutin	Do. ..	2·00	Mars Poultry Farm	B. Orpingtons	1·85
J. Anderson ..	Do. ...	2·15			
T. Taylor	Do. ...	1·95	F. Clayton ..	W. Leghorns	1·90
G. Tomlinson	Do.	1·90	Moritz Bros. ...	Do. ...	2·05
E. F. Dennis ...	B. Orpingtons	1·80	A. F. Camkin ...	Do. ...	1·90
F. Clayton ...	R. I. Reds ...	1·95	W. Becker ...	Do. ...	2·00
Mrs. C. Davis ...	W. Leghorns	1·95	E. E. Dennis ...	W. Wyandottes	1·60
J. G. Richter ...	Do. ...	1·90			
G. H. Turner ...	Do. ...	2·00	Harveston Poultry Farm	W. Leghorns	2·00
E. Pocock	Do. ...	1·95			
H. Jobling ...	B. Orpingtons	1·80	W. Purvis ..	Do. .	1·95
H. W. Board ...	W. Leghorns	1·90	W. Lyell ..	Do. ...	1·95
F. W. Leney ...	Do. ...	2·05	R. Burns ...	B. Orpingtons	1·90
W. Meneely .	Do. ...	1·90	A. Howe ...	W. Leghorns	1·95
J. R. Wilson . .	Do. ...	1·90	L. K. Pettit ...	Do. ...	2·00
T. Fanning ...	B. Orpingtons	1·80	Mrs Bradburne	Do. ...	2·00
Cowan Bros. ...	W. Leghorns	2·10	W. Hirst ...	Do. ...	1·95
A. H. Padman ..	Do. ...	2·00	R. Burns ...	S. L. Wyandottes	2·00
J. M. Manson ...	B. Orpingtons	1·70			
Mrs. Munro ...	W. Leghorns	2·00	T. B. Hawkins...	W. Leghorns	2·05
Geo. Price ...	Do. ...	1·90	Cowan Bros. ...	B. Orpingtons	1·95
W. H. Forsyth ...	B. Orpingtons	1·95	Dr. Jennings ...	W. Leghorns	1·95
King and Watson	W. Leghorns	2·05	T. E. Jarman ...	Do. ...	2·15
Mars Poultry Farm	Do. ...	2·05	J. Gosley ...	Do. ...	1·90
A. W. Bailey ..	Do. ...	1·95	Kelvin Poultry Farm	Do. ...	1·85
G. W. Holland ...	Do. ...	1·95			
F. W. Leney ...	R. I. Reds ...	1·95	C. P. Buchanan	Do. ...	2·55

The Orchard.

FRUITGROWING AT LANDSBOROUGH.

Mr. R. E. Swan, president of the Ratepayers and Fruitgrowers' Progress Association, sends us three more photographs, evidencing the progress of the fruit industry in and around Landsborough. These, taken at Mount Mellum, within a 3-mile radius of the township, show how this district has progressed since the day when the editor of the "Q.A.J." spent a week with the late Australian explorer, Mr. Landsborough, at Caloundra. The impression left on our mind at that time was that the district was merely a sand heap, and covered with poisonous herbs which destroyed a couple of thousand of Mr. Landsborough's sheep. To-day all is changed. Sheep thrive on the coast. Fruit-growing is a success, and generally the whole district has come to the front—so much so that, at the late Exhibition of the National Association at Bowen Park, the local Progress Association, for the first time in the history of the place, furnished a District Exhibit in conjunction with the No. 6 section of the North Coast exhibits.

Plate 31.—Nine-months' old Papaw-tree at Landsborough.

Plate 32.—Stool of Bananas grown on Mr. Verney's Farm without the aid of Fertilisers during Eight Years.

Plate 33.—Bananas on G. Carrington's Farm, Landsborough.

Our illustrations show a papaw tree in full bearing on Mr. A. Stephens's land, planted out in December last. The second is a view of bananas on Mr. Geo. Carrington's farm, of which Mr. C. Ross, Instructor in Fruit Culture, said that he saw none better for size and quality in the fruit-growing districts of Queensland. The third is a view of a stool of bananas growing on land which has been under the same crop for over eight years without the use of manure or any fertiliser. This property is owned by Mr. Robert Verney, who has over 20 acres under bananas.

There are, in all, about 120 acres in the 3-mile radius planted with bananas, mostly in full profit. The pioneers of this profitable industry at Landsborough were the Messrs. Skerman and Verney.

STOCKS USED BY THE CHINESE.

The problem of finding congenial stocks for our cultivated fruit trees is still in an experimental state, for certain stocks which have been proved to have been very successful in Western Europe when tried in America or Australia have proved failures in many instances. Included in a recent report of Mr. Frank N. Meyer, Agricultural Explorer attached to the Office of Foreign Seed and Plant Introduction, U.S.A., there is an interesting description of the stocks used by the Chinese.

It is in a country like China, with her great extremes of climate, that Mr. Meyer hopes that a partial solution of this stock problem will be found. The report proceeds:—

"One of the first things which attracted my attention was that, in the nursery gardens near Tientsin, I found that the Chinese gardeners had grafted flowering plums upon a stock which resembled an almond; also, chrysanthemums on the wormwood (*Artemisia* sp.), tea olives (*Olea fragrans*) on privet, and junipers upon the arbor vitae (*Thuja orientalis*). These facts showed me at once that the Chinese—in North China, at least—had tried to find congenial stocks which had root systems that were better suited to dry and alkaline soils than were the root systems of the plants themselves.

"One of the plants which most impressed me was the Almond-like stock. On asking the Chinese gardeners what they called it, they gave me the name of "Shan tao shu," which means literally "Mountain Peach Tree." This name suggested the possibility of this stock being the original wild peach. Upon inquiry where this could be seen, I was informed that it grew wild in the mountains, but there were many specimens to be found in the gardens of Tientsin and Peking. Upon being shown a specimen I found it to be the *Amygdalus davidiana*, originally discovered by Father David. This turned out to be a new stock never before employed by any of the Caucasian races, although seemingly in China it has been used for centuries as a stock for various stone fruits. It has even been introduced into various European and American botanical collections. After some difficulties seeds were procured of this Davidiana Peach, by which name it has come to be known in this country, and these have been tested in various places in the United States, as Chico, Cal.; Ames, Iowa; and San Antonio, Texas; and, strange to say, they have proved hardy on the northern edge of the Peach belt of Iowa, and drought and alkali resistant in Central Texas, Arizona, and California. It seems as though it would play an important part in the development of the stone-fruit orchards of the country.

"While these furnish examples of the stocks already used by the Chinese, numerous wild plants, especially among the stone fruits, show promise of being valuable as stocks, and experiments with these now are being carried on in the United States to determine their relative value."—"Fruit World."

RED OIL FOR THE RED SPIDER.

Certain fruits are attacked more seriously by Red Spider than others. Almonds take the lead, yet but few of our cultivated trees are immune or sufficiently virile not to show evidences of attack. Prunes, plums, peaches, apples, pears, and cherries all suffer, and all require careful attention; for this pest can be kept in check, though, because the number of its host plants is legion, there is little hope of its extermination.

The surest remedy is an application of Red Oil emulsion, either during the winter or early spring.

Recent experiments have shown that late spraying is both feasible and effective. Oils applied when the fruit buds are swelling have a wonderfully stimulative effect upon the tree; and their application at this time is most effective against the pest. A further advantage is that the twigs are still greasy when the young mites are emerging from the egg, and the tiny creatures cannot settle or thrive upon greasy surfaces.

The remedy lies, therefore, within your own hands; and the fault and loss are your own if you neglect it.

If, through misadventure or carelessness, Red Spider is found upon the leaves during the summer, a lighter-bodied oil may be used, but this must be plentifully mixed with soap to make its application safe.—"Farm Journal," Sydney.

QUARTER ILL; OR, BLACK LEG.

In a Leaflet published in the "Journal of the Board of Agriculture," Volume XXIII., No. 3, June, 1916, on the "Occurrence, Symptoms, and Treatment of Black Leg," it is stated, under the head of "Treatment":—"No form of medical treatment has been discovered which can be relied on to cure blackquarter. Certain remedies have been widely advertised, but they have all proved valueless. Some success has ben claimed in the past for the method of treatment which consists of incising the swellings and dressing the wounds with antiseptics. This method, however, is now seldom adopted, for, if the patient recovers, as it very rarely does, a large area of tissue sloughs, and the convalescent period is, in consequence, long and expensive to the owner."

Viticulture.

WINE-GROWERS' CO-OPERATIVE WINE-CELLARS.

By G. A. GATTINO, Charleville.

In the September issue of this Journal I mentioned how the formation of Wine-growers' Co-operative Wine-cellars would bring great advantages to the farmer and economical benefit to our State and to the agricultural and wine industry.

I gave also a detailed review of all the purposes connected with such institution, and now I will explain the constitution of it.

It is not possible to deal fully with the particulars of the organisation, but I will offer you an idea of same.

The few members that desire to establish a co-operative wine-cellar have to form, before anything else, the rules and regulations of the Cellar itself; the articles which have to define the objects of the association, and the reciprocal rights and obligations of the co-partners.

These rules will have to include the following:—

1st—Classification-admission, succession, and the falling off of members.
2nd—The share of each member in the formation capital.
3rd—The share of each member in the maintenance of the Cellar.
4th—Distribution of profits.
5th—Advances on produce.
6th—Technical and administrative staff.
7th—Executive committee.
8th—Winding up.
9th—Eventual other dispositions.

We will not deal with the latter, which will vary in accordance with the circumstances in which the Cellars are formed, and will instead deal with the classing of members. The founders could be distinguished from the others, so as to give to the former some right to preferential benefits.

The admission and succession of new members and the falling off of others may be arranged by a member's proposal or by right of succession, and by the majority or the unanimous acceptance of the general meeting.

The Executive Committee will have the complete direction of the business of the Cellar, the right of accepting, refusing, or modifying what the Technical Director could propose *re* new methods, and in this case they will give the reasons of their decision to the general meeting.

This Executive Committee will consist of one president and two or four members—depending upon the importance of the Co-operative.

The technical and administrative staff will be constituted by one director and cellarmen.

The duty of the first will be to manage the preparation of wines belonging to the Cellar, and to allocate these preparations in accordance with the qualities of the grapes and the requirements of commercial exigencies. While of small importance, the director will have to keep the books of the Co-operative.

The principal articles of the Co-operative are, however, those which will regulate the contribution of each member to the formation-capital and to the maintenance of the Cellar, and especially in the distribution of profits.

It is evident that the chief principle to adopt in the abovementioned articles will be, that the one who delivers more and better produce to the Cellar will secure more profit, and pay proportionately more for maintenance expenses.

This general principle, although easy looking, is not, however, too easy in application, and as it requires long and complete explanation, I purpose to deal with this in next issue of the Journal.

ARTIFICIAL TEETH FOR HORSES.

The Veterinary Editor of the "North British Agriculturist," in reply to an inquiry *re* the use of artificial or false teeth for horses, gives the following:—"We may state that many years ago we put an artificial tooth into a horse, and since then we have put in several, mostly in the upper jaw and particularly the molar or back teeth. It occasionally happens that some hard body, such as a piece of stone or metal, may have accidentally got into the corn, particularly foreign oats, and the horse, when chewing, gets the foreign substance between his molar teeth, and unfortunately splits one of the teeth into two or more pieces right from the crown to the root of the tooth. When this occurs, the horse drops off his feed and runs at the mouth. It so happens that the bottom of the tooth socket may be damaged, when there is a fœtid or stinking discharge from the nostril. When this is the case, the broken pieces have to be extracted. We have several good specimens beside us. After removing the fragments, we plug the tooth cavity with cotton wool saturated with some antiseptic. That is done every third day for a fortnight, after which we put in the artificial tooth, which is nothing more or less than 4 oz. of gutta-percha, put into hot water until it can be moulded into the shape required. This we press firmly into the tooth cavity, moulding with the fingers the crown until it is level with the crowns of the other teeth. It soon sets and remains firm. A third upper molar tooth is in front of us, which measures from crown to root 3½ in. The root itself is 2¾ in. long and 1 in. square, so that when it is removed it leaves a very big hole, which gets full of food and becomes fœtid and troublesome. The gutta-percha tooth prevents this, and the animal, as a rule, does well. Moral.—In examining horses as to soundness, always examine the teeth.

Apiculture.

DO BEES INJURE FRUIT?

Again we are asked this question first propounded to us and replied to in this Journal in 1899. Since that time we have, in reply to correspondents, published thirteen articles dealing with the subject, all going to show that exhaustive scientific and other experiments have distinctly proved that, so far from injuring the fruit in an orchard or vineyard, the bee is the fruitgrowers' best friend.

Why do our Queensland orchardists and apiculturists not study this question for themselves, seeing that they have exceptional facilities for experimenting? It is natural to suppose that they are as competent judges as American fruitgrowers. The latter, however, differ from the Queensland growers, in that they are constantly investigating for themselves, not resting content with an appeal to the entomologist, and they are only too glad to publish the results of their investigations in the American and Canadian Agricultural Journals. They make experiments in api-, agri-, horti-, and every other culture—they invent little labour-saving appliances, and give them to the world. We seem to be content to follow where they lead. We rarely take the initiative. This is not as it should be. Our agriculturists are quite as intelligent as any in the world, as witness the small farmer who, years ago, invented the first combined corn-husker and sheller ever seen in Queensland, or the man who invented the cane-planting machine in the year 1900 (Mr. Pryce Treva, of Bundaberg). Mr. Treva exhibited his machine at the August Exhibition of the National Association at Bowen Park, and planters who had adopted it stated that it would do the work of thirty men and effected a saving of 10s. per acre—a very important saving in those days of low wages. What is the saving to-day, a day of abnormally high wages demanding the substitution of machine for hand labour?

We should like to see our farmers study things out for themselves, and give the results to the many newspapers which gladly give space to such matters. Any entomologist knows that the antennæ of the bee are incapable of cutting into the skin of sound fruit, and in order to make a start he must first find a hole already made by some other insect, such as the ant or the fruit fly. Yet it is quite true that the bee will bite through the wooden division boards of a hive.

This point was once raised at a meeting of a beekeepers' association, and an explanation was demanded. A bee expert present answered by asking the question: "Why is it that, although a man can bite through a piece of plaster, he cannot make a hole with his teeth through a plaster wall? Yet you say you have seen bees which looked as though they were searching for a weak spot on sound fruit, on which to make an attack, although you very cautiously add that you did not see them actually succeed in piercing the fruit. Bees, although possessed of instinct in the largest degree, are very stupid in many things, and one may often see them trying for hours to do something, which, if they had any reasoning powers, they would have known to be a physicial impossibility. But there is no need to confine ourselves to theory only. The practical test has often been made of placing absolutely sound fruit in the vicinity of bees, care having been first taken to examine the fruit microscopically to see that it was uninjured. In every case, although the bees have hovered around, they have ultimately abandoned it untouched.''

A large beekeeper stated that the fruit crop on a farm near one of his apiaries was worth £100 a year more than it was without the bees.

In 1898 the hon. secretary of the Queensland Beekeepers' Association sent us the following notes by Mr. D. Jones on the above subject:—

''While visiting a suburban gardener a few days since, complaint was made to me of bees injuring last year's crop of grapes. This matter cropped up some years ago at a meeting of the Brisbane Horticultural Society, when the matter was fully discussed, and a complete refutation given to the charge against our innocent bees.

''That they do take advantage of what otherwise would be waste fruit juices is a fact which establishes a sound law in the economy of Nature; for bees will only avail themselves of such fruit juices as appear on fruits already punctured by other insect depredators, such as fruit flies, birds, &c.

''In Queensland we often find, in certain seasons, grapes punctured by the fruit fly. This causes an exudation of juice which the alert bee is sure to seize on, with the result that he is charged as being the culprit originating the injury. Entomological study of the structure of the bee's mouth clearly demonstrates his inability to puncture or injure fruit by such a process.

''In the case of fruit-fly attack, the bees render practical service in restricting the reproduction of the fly, as, by reason of the thorough manner in which the bees drain the injured grape of its juices, they leave only skin which will not sustain the larvæ, if developed from the egg, originally deposited by the fly.

''Fruitgrowers may well look upon bees as their most valuable allies, particularly in Queensland, where so many new varieties of fruits are being experimented with, dependent, as many are, on prompt and perfect pollinisation, which, without the aid of bees, could not be successfully accomplished.

"In America some years since the question was fought out by an expensive lawsuit, when the verdict was emphatically in favour of our bee friends."

[The question of bees puncturing fruit has been frequently discussed in this Journal, and we showed by conclusive evidence that, as Mr. Jones says, not only does the bee not injure fruit, but that the insect is the greatest friend of the orchardist.—Ed. "Q.A.J."]

In a late issue of the "Farm Journal," Sydney, we find the following note on the subject:—

"Every fruitgrower must either keep bees or get his neighbours to do so, and he will be surprised to find not only a finer quality in his fruit, but a much higher yield per tree.

BEES DO NOT INJURE FRUIT.

The orchardist need not let the old fallacy about the bees destroying and eating his fruit worry him, as test cases in the highest courts have proved the fact that bees do not injure sound fruit, but extract the juice from it after birds and other enemies have injured it. Hundreds of fruitgrowers in the United States grant free pasturage to beekeepers solely for the benefit they derive in the fertilisation of the fruit trees. I will conclude by saying:—"Keep bees and lots of them"; and the little labour entailed will be amply repaid, with also a bonus of honey for your own use or for sale."

CANARY SEED.

" T.W.G.," Clifton—

1. For bird food.

2. This is a question which should be referred to a medical adviser.

3. Yes. A heavy crop of canary grass will often yield over 3 tons of hay, and the young crop may be grazed off by sheep, provided they are not kept on it too long, particularly when late in the season. The straw makes excellent chaff.

4. A canary-seed crop can be harvested in the same way as a wheat crop, and may be threshed out by a wheat-threshing machine, taking care, however, that the machine is in charge of a man who thoroughly understands the setting of the machine, to avoid skinning and crushing the seed on the one hand, and leaving a quantity of seed in half-threshed heads on the other. Where wheat is not grown, and consequently no threshing machines are used, it would not pay a farmer to buy a machine for a small crop. He could only make use of the old-fashioned flail.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table showing the Average Rainfall for the Month of August in the Agricultural Districts, together with Total Rainfalls during August, 1916 and 1915, for Comparison.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Aug.	No. of Years' Re-cords.	Aug., 1916.	Aug., 1915.
North Coast.	In.		In.	In.
Atherton	0·87	15	0·73	Nil
Cairns	1·85	34	1·64	0·06
Cardwell	1·26	44	2·79	Nil
Cooktown	1·46	40	0·93	0·23
Herberton	0·64	29	0·79	Nil
Ingham	1·34	24	2·36	0·04
Innisfail	5·27	35	3·08	0·43
Mossman	1·25	4	1·82	0·34
Townsville	0·41	45	0 63	0·53
Central Coast.				
Ayr	0·38	29	0·63	0·38
Bowen	0·63	45	0·92	0·51
Charters Towers ...	0·37	34	1·91	Nil
Mackay	0·98	45	0·85	0·88
Proserpine	0·89	13	0·72	0·99
St. Lawrence ...	0·89	45	1·17	0·40
South Coast.				
Biggenden	1·18	17	2·42	1·82
Bundaberg	1·43	33	2·36	1·31
Brisbane	2·27	65	1·73	1·60
Childers	1·26	21	2·00	0·48
Crohamhurst ...	2·27	23	5·19	1·86
Esk	1·70	29	1·53	1·99
Gayndah	1·26	45	2·04	1·32
Gympie	1·89	46	3·88	1·47
Glasshouse M'tains	1·62	8	3·14	1·45
Kilkivan	1·62	37	2·41	1·23
Maryborough ...	1·79	45	2·66	1·21
South Coast— continued:	In.		In.	In.
Nambour	1·89	20	4·54	1·84
Nanango	1·51	34	1·25	1·42
Rockhampton ...	0·92	29	2·03	0·41
Woodford	1·98	29	2·97	1·22
Darling Downs.				
Dalby	1·26	46	2·01	1·18
Emu Vale	1·25	20	1·96	1·72
Jimbour	1·36	28	1·12	2·25
Miles	1·30	31	1·33	1·51
Stanthorpe ...	1·95	43	2·26	1·60
Toowoomba ...	1·83	44	2·22	1·54
Warwick	1·55	29	1·92	1·76
Maranoa.				
Roma	0·97	42	1·56	1·15
State Farms, &c.				
Bungeworgorai ..	0·68	4	1·51	1·20
Gatton College ...	1·33	17	1·79	1·62
Gindie	0 66	17	1·06	1·29
Hermitage ...	1·53	10	2·13	1·98
Kairi	0·74	4	0·55	Nil
Kamerunga ..	1·51	26	2·08	0·05
Sugar Experiment Station, Mackay	0·77	19	1·30	1·05
Warren	0·12	3	...	0·18

Note.—The averages have been compiled from official data during the periods indicated; but the totals for August this year and for the same period of 1915, having been compiled from telegraphic reports, are subject to revision.

J. H. HARTSHORN,
Acting Divisional Officer.

Botany.

ILLUSTRATED NOTES ON THE WEEDS OF QUEENSLAND.

BY J. F. BAILEY, Government Botanist, AND C. T. WHITE, Assistant Government Botanist.

No. 5.

SIDA ACUTA, *Burm.* (Order Malvaceæ).

An undershrub. Leaves nearly glabrous, 2-3 in. long, linear-lanceolate, serrate, shortly stalked. Flowers yellow, on short stalks which are jointed about the middle. Carpels rugose, bearing two sharp spines.

It is somewhat difficult to say whether this species is a native or introduced. It is a widely-spread weed of tropical countries, and in its great similarity to *Sida rhombifolia* (more commonly known as *Sida retusa*) may have been passed over by general collectors in Queensland.

Specimens have during the past few years been received from various Northern localities. Mr. E. Jarvis, Gordonvale, near Cairns, says that it is a great pest, and the commonest species of *Sida* about there. In a recent visit to Townsville we noticed that this and *Sida cordifolia* were two of the commonest weeds of the district, the species now under notice being much more prevalent than the well-known and very similar *Sida retusa*.

The chief distinctions between these two closely-allied weeds are—

Leaves linear-lanceolate; peduncle (flower-stalk) as long as the petiole (leaf-stalk); carpels 5-9, rugose, spined.—*S. acuta.*

Leaves generally more or less rhomboid; peduncle longer than the petiole; carpels 8-10, smooth or reticulate, with or without terminal spines.—*S. rhombifolia* (*S. retusa*).

In the field the former can be told by its livelier green colour and general appearance.

USES.—Though a noxious weed, the following extracts show it to have some economic uses:—

"The stems yield a good fibre. The natives make brooms, with which they sweep their houses, of the stems of this and allied species, gathering them afresh each morning. In the Philippines, according to Padre Blanco, poultices are made by boiling the leaves, and are applied to ulcers and other sores. In India a tonic is made from the plant which is said to be a good appetiser."—W. E. Safford, "The Useful Plants of the Island of Guam."

"The root resembles common liquorice, but is very bitter. The infusion of the root combined with ginger is given in intermittents and in chronic diarrhœa. The leaves bruised with oil are used, applied externally as a poultice to accelerate suppuration. An infusion of the root is a very useful bitter tonic and astringent."—G. E. Balfour, "Cyclopedia of India."

ERADICATION.—In small areas hand-pulling or cutting off below the surface of the soil is the most effective method; in larger areas where the plants are growing thickly together, spraying with any of the weed-killing preparations obtainable at the shops should be successful. The plants should be dealt with prior to seeding.

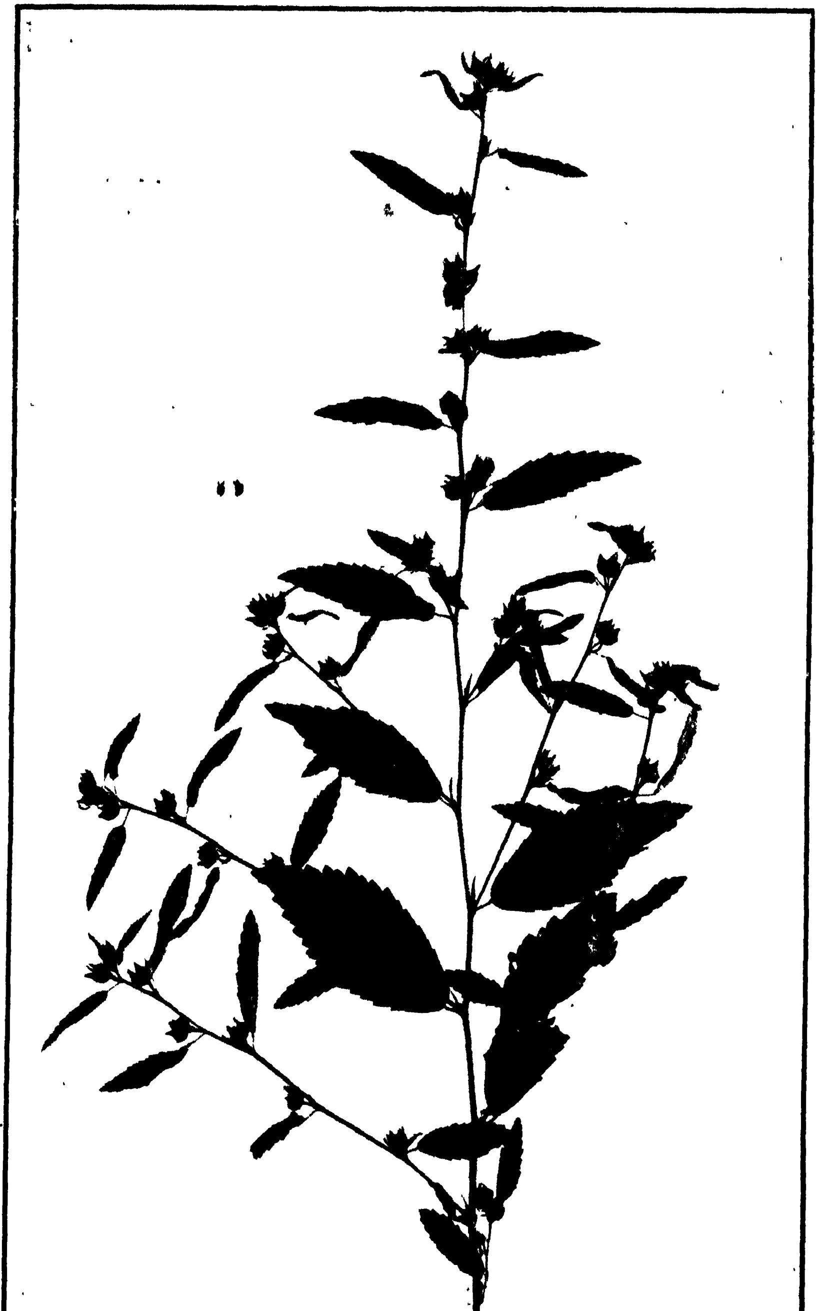


PLATE 34.—SIDA ACUTA, *Burm.*

Science.

SOIL ANALYSIS.

In the March (1916) issue of this Journal we published an article on the above subject taken from a Leaflet (No. 293) issued by the Board of Agriculture and Fisheries. In Volume XXII., No. 2, of the "Journal of the Board of Agriculture," a paper by E. J. Russell, D.Sc., Rothamsted Experimental Station, was published in which the difficulties of obtaining an absolutely reliable analysis of any given soil are pointed out. Mr. Russell wrote:—

"Analysis is the method adopted by the expert adviser for obtaining certain information about a soil. It includes chemical, physical, and bacteriological investigations; and it may be accompanied by more general field observations for the purpose of discovering the nature of the subsoil, of the water supply, and of the climatic and other conditions important for the growth of plants.

"A full investigation of this kind is found to be too laborious for ordinary use, and in practice shorter methods are commonly necessary. These do not aim at giving a complete account of the soil, but they express the amounts of certain substances present which are known to have an important effect on the crop production. Experience has shown, however, that these methods are at their best when used for purposes of comparison, and as far as possible they should only be applied in this way. The analysis of a casual sample of soil from a district of which the analyst has no intimate knowledge is a much more difficult affair, and is often unsatisfactory both to him and to the farmer. Indeed, from the farmer's point of view, the question as to whether a soil analysis is worth conducting depends very largely on the possibility of making a comparison with some similar soil about which definite knowledge has been obtained by field experiments.

"Fortunately, this country is now provided with organised schemes under which such systematic field experiments may be made and the results recorded; the possibility of setting up comparisons is therefore steadily increasing.

"HOW A SOIL ANALYSIS MAY BE USEFUL.

"In at least three distinct cases useful help can be given by the soil expert—

(1) The simplest case arises when a farmer wants to know whether he has any reasonable chance of obtaining results similar to those demonstrated by field experiments on another farm in his locality. Where, for instance, such experiments have demonstrated the advantage of applying lime, phosphates, or potash, the expert can with considerable accuracy say whether similar results can be obtained on the farm in

question. He cannot be absolutely certain, as there is always an unknown factor, but the chances are that he comes out right. There is no doubt that much more use might be made of field experiments in this way with considerable gain both to farmers and the officers advising them.

(2) Another comparatively simple case arises when a farmer wishes to adopt some system of cropping or soil treatment known to give good results elsewhere in the locality, but before embarking on the change he desires to know how far his soil conditions resemble those where the method works well. Here examination may reveal some difference which, while not very obvious to casual inspection, is of vital importance to the success of the enterprise. Two heavy soils, for instance, may look very much alike, but one may owe its heaviness to very fine particles and the other to silt particles. Methods that succeed in one case have often failed in the other. If the farmer is aware of the difference, he can make his plans accordingly.

(3) The problem is rather more extensive when a man is entering on a new farm and wants to obtain as complete information as possible about the soil. Here the farmer must remember that no one person can possibly give him all the information that could be gleaned; chemists, bacteriologists, physicists, could each say a good deal without exhausting the subject. A selection has to be made, and much time is saved where an interview can be arranged on the spot with the expert consulted, who can then ascertain exactly what information is wanted. Most farmers feel that they have a bent for some special branch of production, and they naturally wish to exercise their powers in the right direction.

"On the other hand, many soils have some special feature fitting them for some particular crops better than for others. A certain amount of accommodation is possible on both sides: The farmer may alter both his scheme and his soil, and the best results cannot be obtained till the process is complete and the scheme made to fit the possibilities of the soil. This end may be and often is attained by the costly and bitter method of experience; it can, however, often be reached more quickly by securing the services of the expert. In the first place, an investigation will show whether the soil and the general conditions resemble those obtaining where the proposed system of husbandry is known to be a success. It may reveal the more important differences and enable the farmer and the expert to discuss methods by which they may be overcome. Secondly, a comparison of the results with others obtained in the locality will show the expert to what type the soil belongs, and he can then inform the farmer what systems of farming are known to succeed on this type. Thus the materials for a comparison can be got together. Although no one would pretend that anything like complete information could be obtained in this way, it is certain that money and valuable time can often be saved.

"DIFFICULTIES.

"The problem becomes much more difficult directly the soil expert gets away from comparisons and is asked to make an absolute pronouncement on a sample of soil considered by itself. Of course, if he has considerable local knowledge, or if a soil survey of the district has been made, he may discover a standard of comparison, and then matters proceed tolerably smoothly. Failing this, he feels that his ground is very uncertain; he has to try and put some absolute value on the quantities obtained by analysis, and in interpreting the results a good deal of balancing of probabilities becomes necessary. This is always a delicate business, and is likely enough to miscarry.

"Still more difficult is the case when the farmer does not ask for definite information on specific points, but puts the general (and natural) question—How can I manure my land at greater profit than I am getting at present? Although every farmer must ask himself this question, he will, after careful thought, quickly realise that it is much too complex to be answered off-hand. The analyst may be able to report that similar soils under similar conditions have given satisfactory returns for the application of certain manures to certain crops; but the question whether equal returns would be satisfactory on the farm in question depends on many other factors—the amount of capital available, the market facilities, the general economy of the whole farm, &c.—and a satisfactory answer can usually only be obtained when the whole question has been discussed by the farmer, the agricultural expert, and the soil expert. Short of this, the best method is for the analyst to suggest two or three systems of manuring, and for the farmer to give them as good a trial as possible before making the final selection. This problem, of course, becomes more and more easy as the number of analyses is multiplied, but it continues to be very difficult until the expert's work is well organised.

"CONCLUSIONS.

"The farmer who wishes to derive the maximum assistance from soil analysis must bear the following points in mind:—

(1) The simplest problem for the expert is to compare soils; and, therefore, the chances of success are greatest when a soil survey has been made or when some similar soil has been under proper field experiments.

(2) The object of the analysis is to furnish information; but no one has the time, even if he had the power, to set out all that can be discovered about a particular sample of soil. The farmer must, therefore, arrange to go over the land with the expert and discuss on the spot the various points on which information is desired; the necessary samples can then be drawn with the proper tools and with all due precautions.

(3) Finally, it should be remembered that the problem is very difficult indeed when no satisfactory standards exist, and where the expert has not made a personal inspection; so much balancing of probabilities has to be done that no expert can give more than a general opinion, or do more than submit two or three alternative schemes for consideration and trial."

Entomology.

THE SPIDER OR TICK FLY OF THE HORSE.

HIPPOBOSCA EQUINA, LINNÉ.

BY HENRY TRYON, Entomologist.

INTRODUCTORY.

On 4th July, 1916, a correspondent (R.B.S.) forwarded from the Glass Mountains district, of Southern Queensland, a specimen of a fly previously unknown to him, writing regarding it as follows:—

''I have not before seen it. . . . It is awfully severe on horses especially, and is extremely irritating. It seems partial to their ears. They are not as yet in evidence to any very serious extent.''

On the receipt of this intimation, and of the specimen of the insect to which it referred, a letter, dated 7th July, was forwarded to this correspondent communicating the fact of the identity of the insect in question with *Hippobosca equina*, Linné, embodying briefly an account of the principal incidents of the life history of the species, its habits, its probable source (New Caledonia), and the treatment of horses threatened with its attacks.

This in due course R.B.S. communicated to the Brisbane Press, our letter being embodied in an article headed ''A Flying Tick, Unwelcome Visitor to Queensland.''—*Brisbane Courier*, 20th July, 1916.

In this article, evidently inspired if not penned by R.B.S. himself, the writer states: ''It is feared (that) when the warm weather comes round again the evil will spread rapidly,'' and ''being winged it has means of colonisation of a most alarming nature.'' ''Mr. Shackleton's theory'' [it adds] '' is that possibly it may have been introduced into this country in its chrysalis state as a stowaway per medium of recent shipments from Argentina.''*

In view of the discovery of this ecto-parasite, associated with the horse in Queensland, and its alleged significance, the following particulars regarding *Hippobosca equina*, Lin., may be of interest:—

DESIGNATION.

Hippobosca (*Fr.* Hippobosque); Spider Fly (*Fr.* Mouche araignée *Ital.* Mosca ragno); Flat Fly; Forest Fly; *Germ.*, Pferde Lausefliege (Horse Louse Fly); Flying Tick or Tick-Fly.

The insect being a fly, and not a louse nor a tick, neither of those two latter terms should enter into its designation, except adjectively. The word ''Forest,'' applied to it in England, has reference to its principal place of occurrence there, *i.e.*, the New Forest. ''Flying Tick'' has been bestowed upon it in Australia, exclusively; but the term Tick-Fly would more appropriately commemorate its systematic position, as well as also its parasitic habit.

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*See also Tryon, H. The Tick Fly. *Queenslander*, Brisbane, 2 Sept., 1916, p. 35.

Systematic relations.

This fly belongs to a group of these insects that have not the proboscis characteristic of the majority of other Diptera, and that is therefore designated *Eproboscideæ.* It is also one of those flies that do not deposit eggs, and that although they give birth to young representing the next phase of insect life, or maggots, these are at an advanced age and ready to transform almost immediately. Hence, the section of flies including it is named *Pupipara.*

GENERAL PARASITIC HABIT.

The pupiparous flies are all associated as external parasites with warm-blooded animals, birds, or mammals, and sometimes their degraded habits have led to their being unendowed with wings, as in the common parasite of the flying-fox (*Pteropus* spp.), named *Nycteribia,* and the so-called sheep tick, or Ked (*Melophagus ovinus*). There are again flies of this group that lose their wings when once they have found their host. Such is the Hippoboscid met with upon the deer in Europe.

There are several kinds of these flies represented in the Australian fauna proper, they being found to occur on many of our birds, especially the larger ones, the birds of prey (eagles, hawks, and owls) quite commonly harbouring them. But the smaller members of our avifuma also possess "spider flies" of their own, *e.g.,* the Martin and the Emu Wren, amongst others. They occur, again, on our marsupials. Not only is there on these animals a very small one that may occur on wallabies, whose body scarcely exceed ⅛ in. in length, one of intermediate size that appears to be the *Feronia Macleayi,* Leach (more correctly *Ortholfersia Macleayi* (Leach) Speiser), but a quite large hippoboscid whose body length exceeds ¼ in., and is identical with the common *Ornithomyia* of birds of prey, the introduced *O. avicularia.*

THE HIPPOBOSCA SPIDER FLIES.

The *Hippobosca equina* (so named by Linné, in 1761, when writing on the fauna of Sweden) has apparently no congeners in Australia, although two Australian spider flies have been referred to Hippobosca (*H. australis,* Guèrin, and *H. viridipes,* Walker). However, certain Australian Spider Flies, except by those who recognise nice distinctions, may be confounded with members of the genus *Hippobosca* as now understood, and even with the one now before us, *H. equina.**

There are about twelve different kinds of Spider Flies that have been referred to the genus *Hippobosca.*

The external parasites comprised in it are furnished by the faunas of Europe, Africa, Asia, and the East Indies. (It does not appear that any true Hippobosca occurs in the "New World.") They have for their proper hosts horses (*Hippobosca equina,* Linn.; *H. maculata,* Leach; *H. rufipes,* von Olfers), bucks, camels, dogs, and felines (*H. canina,* Rond.,

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*In the "Agricultural Gazette" of New South Wales for December, 1900, a Spider Fly that has ocelli and an anal wing-cell has erroneously been named *Hippobosca equina,* that possesses neither of these features.

H. capensis, von Olfers), and—in Australia—marsupials; whilst a single species (*H. struthionis,* Janson) occurs on the ostrich.

They do not, however, exclusively occur severally upon these hosts, sometimes, indeed, fastening upon man himself. Thus Rondani mentions (1878, p. 164) that the particular Spider Fly now under consideration, *Hippobosca equina,* "vivit equiis, bovibus, canibus et aliis animalibus" (lives upon horses, cattle dogs, and other animals). Each different kind, however, appears to favour especially a single animal host.

RELATION TO THEIR HOSTS.

The Spider Flies are included in the group of Blood Sucking Insects, but an examination of the living object does not favour the view that they extract blood in quantity as does a Tick, a Gad Fly (Tabanus), a Biting Fly, *Stomoxys,* &c.) or a Mosquito; and, when they occasion annoyance to animals it is not as blood-suckers, with the resultant symptoms of anæmia, but as irritating insects productive of more or less pruritus.

Indeed, individual animals can tolerate their presence in quite large numbers without apparent inconvenience, whilst others are highly disturbed by their presence upon them.

In the new forest, the part of England where the insect now under notice (*Hippobosca equina*) is especially prevalent (wherefore it is named the "Forest Fly"), individual rough-coated ponies may literally swarm with the insect without yielding much evidence of sensibility of their presence, much less symptoms of ill-health; nor do we find that any wild animal or bird that harbours Spider Flies is ever in poor condition, unless there are circumstances explanatory of this, other than that yielded by the presence of their fly-guests.

Again, although there be a great deal of literature relating to these insects, little has been published on them from the purely economic standpoint. In fact, the late Miss E. A. Ormerod's comprehensive account of the "Forest Flies," written in 1895, is quite exceptional in this respect.

DESCRIPTION.

1. *The Fly.*—The *Hippobosca equina,* L., is a peculiarly flattened glossy insect having a distinctly tough, leathery constitution, and somewhat exceeding an ordinary housefly in size. Its head, broadly implanted in the mid-body, has two conspicuous oval black eyes (but no ocelli), and is directed horizontally forward. The two wings are very pale-brown, and partly covering one another reach backwards beyond the hind-body. These organs have a strong hairy rib extending along the fore-border, and the basal two-thirds of this costa receives four brown-coloured veins, of which the outermost two are united in a fork at about half the wing's length. Within the wing, and internal to these veins, are two others of the same colour; that falling short of the wing-border end in two short slanting cross-veins, and so enclose elongated discal-cells. There is no anal cell. The thorax, or mid-body, is large and broad, and is composed above of mesonotum and scutellum, the former having an impressed line crossing it, and a narrow groove passing down its centre. The hind-body or abdomen is bag-like, semi-oval in outline, with the hind-border

shallowly concave. The legs are short and are directed outwards, and each ends in two bifid claws; and the feet, being also endowed with special appendages of a very peculiar character, are singularly prehensile organs.* The head has its front deeply excavated. and from this hollow project two dark-coloured hairy plates or lamellæ; that, answering as palps, serve to conceal the so-called proboscis that lies beneath them. The feelers (antennæ) are very short, apparently unjointed, and have two terminal bristles of unequal length. They lie in little hollows, one on each side of the face. The fly is of a general brownish colour of varying intensity in different individuals, and has a pale spot above in the centre of the scutellum, and one on each shoulder in front of the wing-origin. There are bristle-like hairs occurring here and there, those on the thorax above occupying special areas only. The hind-body again has much more numerous shorter weaker ones clothing it. In size the insect varies, being usually rather more than $\frac{1}{3}$ in. from the front of the head to the tip of the hind body, and $\frac{5}{12}$ in. from the former to the end of the closed wings that extend beyond it. When parturition has taken place, however, or the insect is dead and dry, it is, of course, smaller. The Queensland specimen before us has the above measurements—7 mm. (or $\frac{1}{8}$ in.) and 9·5 mm. ($\frac{1}{4}$ in.), respectively.

2. *The Puparium.*—This is a very singular body that, as we are informed by writers on the subject of this insect, is usually regarded as an egg, and especially so, not only on account of its colour and form, but since it may be seen to issue immediately from the body of the parent fly. It measures about 2 lines (4 mm.) in length.

It is thus described by M. de Réaumur, writing in 1752:—"The egg-like body when deposited was white, with the exception of two projections at one end, the space between them, and some amount of the parts in the vicinity of the notch; the envelope hard and firm, and becoming still more so as it changed to a brown colour, and thence in about twenty hours to a shining black, when it could resist a considerable pressure."—*Transl.* E. A. Omerod, *Op. cit.*, p. 107.

LIFE HISTORY AND HABITS.

The Horse Spider or Tick Fly is a constant parasite of its host as are other Spider Flies in relation to those animals or birds that they especially affect. If it fly off its body it is only to make a short and rapid excursion to another part of it or to another animal close at hand, or when an effort is being made to capture it, or on the animal with which it is associated having died or been killed and someone is too suddenly approaching it. Accordingly, one seldom, if ever, encounters the insect upon the wing. When settling, or on being disturbed, it will slither through the animal's hair with remarkable rapidity, moving apparently with equal facility backwards, forwards, or sideways; and, when impelled to exercise additional activity, it indulges in a succession of little short, but sudden, leaps. When at rest it appears to favour especially parts where there is little hair and the skin is comparatively tender and thin, especially about the perineum, at root of and beneath the tail, &c. Here it seems to feed not only on the blood which only to a small extent yields it its proper aliment, but also on the surface exudations of one kind or another. Apparently the mere insertion by the fly of its proboscis into the skin of its host in extracting blood irritates the latter, as a rule, but little; and when annoyance is felt by the horse, this arises from the sensation due to its sharp hook-like claws grasping tenaciously the hair of the skin or pricking this as it moves jerkingly over its surface. But, notwithstanding numerous individual flies may infest a single animal, this may occur—as has already been remarked—without the latter manifesting any special indications of discomfiture. On the other hand, horses that are not accustomed to its presence upon them, when visited by it, evince every symptom of extreme irritation and intense annoyance, kicking and stampeding about much worse even than when visited by the Horse Bot Fly (*Gastrophilus equi*). The historian of British Farm Insects (J. Curtis), writing on this subject, states as follows:—"By running over the delicate skin of the high-bred horse, it causes an insupportable irritation with its claws, which the rough-coated forest-pony almost disregards"—Curtis, J., 1855. On the same subject a recent writer (H. Bastin), after referring to the presence of the insect in the New Forest (England), also writes:—"It may sometimes be seen clinging in enormous numbers to ponies and cattle. Curiously enough, its bite appears not to cause pain, and beasts which have been bred in the Forest show no sign of annoyance, although strange horses are driven almost frantic by the irritation caused by the insects wandering over them"—Bastin, H., 1913, p. 188. The proportion between male and female individuals does not appear to have been recorded.

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* **Miss E. A. Ormerod, in the Memoir already cited, issued in 1896, publishes two most excellent plates, drawn by Horace Knight, representing the elaborately constructed foot of *Hippobosca equina*.**

Union of the sexes—it is known, however—takes place whilst the flies are on the horse's body, and the period of gestation is comparatively long compared with that of other flies—generally speaking. This is accounted for by the following remarkable circumstance that may be narrated in the words of Miss Ormerod:—

"The important part in the life-history of this fly [she has written] is that, like others of the division of the *Pupipara* to which it belongs, the egg is hatched, and the maggot (or *larva*) feeds and is nourished up to maturity within the abdomen of the parent fly. When fully developed, this larva is deposited, not as an ordinary maggot, but as a *puparium*, or pupa-case, within which the larva is then completing its immediate change to the pupal or chrysalis state, and from which puparium the perfect fly emerges, it may be in about a month, or it may be after a much longer period, according to weather and other circumstances."*—Ormerod, E. A., 1896, p. 106.

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* The researches into the method and progress of the young Spider Fly, first within the body of the mother insect and then within the extruded puparium, on which the above information—now a matter of common knowledge—is based, were carried out by the celebrated French savant (M. de Réaumur) in 1739-40, and are recorded in his "Mémoires," published at Paris a few years subsequently.—Réaumur, M. de, 1752.

Mons. E. Mossonat and C. Vinnet have pointed out (1913) that whilst the larva turns brown within 2 or 3 hours, the period passed by the insect in the puparium is dependent on temperature. This is from 28 to 35 days at 20° C. to 21° C. (68°-69° Fahr); but if kept at 35° C. (95° Fahr.) the period may be only 25 days; whilst a puparium kept at a high altitude required 50 days for emergence of the insect.

A Russian investigator (Professor Cholodkovsky), describing in detail the method in which the larval *Hippobosca* is nourished, when as yet unborn, states that this by means of so-called milk glands. (Milch drüsen).—Cholodkovsky, 1908, pp. 112-119.

Singular to relate—although a feature common to allied pupiparous flies—the Horse Spider Fly, although endowed with two ovaries, produces but a single puparium at a time; the development of its progeny, carried on to the extent that the attainment of this stage implies, making so great a demand on its procreative potentialities.

This egg-like " chrysalis," already described (*vide* pg. 270) has been met with on the soil, in crannies therein, and at the roots of grass; but the usual position of its occurrence has not, so far as we are aware, been observed. It is a matter of certainty, however, that the puparium does not occur attached to its host.

After its deposition, a month or more must elapse before it gives rise to the fly that meanwhile has been developing within it; and for the further life of this it must gain access to a host animal or otherwise die in one way or another. However, when once the relation between host and insect has been established, its longevity—for an insect—is evidently protracted.

INTERMEDIARY FOR DISEASE PROPAGATION.

The Horse Spider—or Tick Fly—has not been shown to serve as a carrier, much less to take a special part in the development of any "germ" or parasite of other kind capable of producing, or essential to the production of, disease in any animal. In which respect, therefore, it must be placed in a different category from its ally, the Tsetse Fly (*Glossina*), or ticks of one kind or another, &c.

Notwithstanding, it must be borne in mind that two other species of *Hippobosca*—viz., *H. maculata*, Leach, and *H. rufipes*, von Olfers—have been mentioned as being capable of disseminating a trypanosomiasis of cattle associated with "gall sickness" in the Transvaal (*cf.* Comptes Rendus Hebdom. des Sciences et Mem. de la Sociéte de Biologie, 1903, pp. 242-3).

Again another pupiparous fly, very distinct from *Hippobosca*, named Lynchia maura, has been similarly shown to serve as the carrier of a disease of pigeons, due to the parasite *Halteridium columbæ*.

DISSEMINATION AND LOCAL INCREASE.

Hippobosca equina, Linné, has already a very extended range of occurrence. Austen informs us (1906, p. 64) that there are specimens in the British Museum (N.H.), London, not only from the European countries but from Algeria, Cape of Good Hope, Madeira, Canary Islands, St. Michael, Azores, Trebizond, Turkey in Asia, Upper Burmah, Celebes, Fiji, New Caledonia; to which may be added, on the authority of other writers, Nigeria and Persia. It is significant, perhaps, that *Hippobosca* does not appear to occur in the "New World."

When we consider how closely, in all respects, the fly is associated with its special host (and how, too, it may attach itself to other animals, as hosts also), and the extent to which the transference of these potential carriers of it from place to place is effected, this wide distribution of this Spider Fly is readily intelligible; but not so its detection, when present upon them, this being not readily practicable on account of its active and furtive habits.

It must not, however, be assumed that, in countries in which it is established, it is generally prevalent therein; even in those in which it has long occurred. Linné, writing in the Fauna of Sweden in 1761, describes it as one of the insects of that country, but it is still very local there. And although Jean Barbut, as we know from a literary citation, made by Miss Ormerod, mentions it as a British insect in 1781, and notwithstanding it occurred in the New Forest district (Hampshire) sixty years since so numerously that Curtis, writing then, stated that "from their flanks [those of white horses running there] the spider flies may be swept in handfuls" (Cyclopædia of Agriculture, ed Morton, vol. II., p. 99), yet it is still only prevalent in England in the locality mentioned, and in some parts of Wales, although also specimens have been received from Dorsetshire.

When we consider that the female *Hippobosca equina* produces but a single individual at a birth—and that, by reason of its life-history, weeks must occur between the production of one fly and another, and that many enemies ordinarily confront insect life generally—we can readily understand how this increase must be surprisingly slow, and the dissemination of the insect correspondingly abridged.

Hence, even were the parasite very pernicious (which is not the case), the occurrence of a few individuals in any locality need not occasion much apprehension of ill effects threatening our equines. Newstead (1907) has dealt with the mode in which the *Puparium,* or so-called "chrysalis," of it may be conveyed from place to place, so that there is no reason to presume that it may arrive here in cargoes of grain—a means suggested to explain its advent by our correspondent (*vide* p. 267).

ITS ORIGINAL HOME.

With regard to the original home of this Spider Fly, it is perhaps idle to speculate; but the probability is that it corresponds with that whence the horse itself originated; and it is significant that Northern Africa to-day appears to be the region also in which the genus *Hippobosca* finds its most numerous exponents. Southern Europe should, it is considered, be excluded from this consideration. Thus the writer can find no mention of it in any of the numerous Latin writers on "Res Rustica" (Agriculture) whose works are extant, not excepting the veterinary manual of R. Vegetius "Ars Veterinaria sive Mulomedecina" (ed. Gesner 1735), who deals especially with the ailments of the horse.

However, in the fables of the Greek Æsop, there is one that possibly has reference to this insect, but of this only the Latin version has been preserved:—

> "Starent Quadrigæ cum paratæ cursui,
> Musca advolans temoni earum insederat;
> Misso ergo signo, illisque procurrentibus,
> Pulsu Rotarum et Quadrupedantis ungulæ
> Pulveres Nubes mota opacit diem:
> Tum in se ipsa gestiens, Dii magni, ait,
> Quantam profundi vim excitari pulveris!"*

—*Fabularum Æsopicarum Delectus* (A. Alsop), Oxoniæ, 1698, p. 120.

In these lines the great moralist evidently alludes to an insect quite distinct from the fly that alighted upon the mule in the same situation when the slow gait of this patient animal was far from making the dust fly, for it is made to object—*Quam tarda es!* (*Op. cit.*, Fab. 193, pg. 110.)

This authority on natural history—one whose works were already extant in the age of Plato, Euripides, Aristotle, and Herodotus—has been quoted, since the indication of the original home of an insect has great value for those who—as do entomologists in these recent times—may figure in modern Oydsseys, in quest of one insect wherewith to subdue another, for the parasite of *Hippobosca equina* itself still awaits discovery.

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* The steeds stood ready on race intent
When a fly approaching to their temonus went,
The sign received, now spinning they go
The wheels fly 'round they dash on so.
The dust in clouds
The daylight shrouds
Reflecting then, "great gods!" said he,
"What a terrible stour caus'd I've to be."

(H.T.)

General Notes.

A NEW ALLY.

PART PLAYED BY BEES IN FIGHTS ON LAND AND SEA.

The busy bee is distributed widely in all parts of the world! How often the prying instinct of the worker belies her intense energy. her untiring devotion to life's work, her life's task—an immense task—to be fulfilled in all too short a span of days. Oft, on a summer day, an unwelcome visitor, hovering insistently, at no discreet distance, as if there were no work in life but to pry into the affairs of others. But it is merely that she will miss no possible chance. And, considering her comparatively insignificant size, what a wonderful amount of respect she commands.

The attention of the world is centred on the war upheaval in Europe! In the actual war zone it would seem incredible that the bee could, in any possible way, receive notice, or attract attention! Yet the bee has been in evidence, has, with that wonderful assertiveness all its own, actually helped the Allies.

BELGIAN'S BEE-BOMB.

A handful of Belgians were barricaded on a bee farm. An attack was made by an overwhelming force of Germans. When the end appeared inevitable, the beehives were thrown over the barricades, at a few yards' range, into the mass of Germans. In ten minutes the last German had fled! The situation had been saved by these new allies.

Even in South Africa the bee has claimed attention. At East London the story is told of the mounted corps ready for the front, and a swarm of bees meeting in the street, the former swerved perceptibly, broke in disorder from its line of route, and passed hurriedly on the other side. In modern times, as existing records show, the Germans appear to have suffered particularly from bee attack in war. At the battle of Sadowa, relates General Moltke, in his history of the 1866 campaign, during the height of the battle, a shell burst among some beehives, in a position occupied by his men. Sabre or bullet were of no use, the men had great difficulty in defending themselves from the fierce determined attack made on them by the bees, which resulted in the Prussians retreating, leaving four dead on the field of battle. The leading bee journals have recently contained many references to the curious and interesting association of bees and war. The "British Bee Journal" states that the first recorded instance occurred in England—about the year 908 A.D. Danes and Norwegians coming from Ireland, laid siege to Chester. Protected by hurdles, beneath the city walls, an attempt by the Danes was made to undermine the city walls. Rocks were hurled down upon them, also boiling honey. The hurdles were then covered with hides. Then the bees came into play. " The English, as a last resort, gathered all the beehives in the city, and flung them down upon their foes. The Danes were so frightfully stung on the legs, hands, and heads, that, in despair, they abandoned the siege." The next instance, we are told, occurred thirty years later. Otto the Great was at that time laying the foundations of the German Empire. A revolt led by the Duke of Lorraine, was, up to a point, successful, until one, Immo the Crafty, came to King Otto's assistance. By his advice, large numbers of beehives were collected, and flung out against the Duke's horsemen during the attack. The bees poured from the hives, the maddened horses became uncontrollable, the defenders made a sally and the rout was complete. At the siege of Acre by the Christians, military engines were made for slinging beehives. The Bishop of Puy caused all the beehives at and in the neighbourhood of Namur to be collected and sent to the front. These were to be fired at the city, to keep the Saracens at bay, while the fortress was being undermined. A sufficient supply of this "ammunition" having arrived, twenty-five mangonels commenced slinging their hives at the same moment. . . . The bees went swarming into the enemy's ears, stinging them in the eyes and torturing them until they fled. Then the Christians broke through the walls, and in this manner was taken and conquered, the noble city of Acre.

The "American Bee Journal" also refers to other instances. recorded by Appian, the Themiscyrans, besieged by Lucullus, turned upon the enemy "not only bears and other ferocious beasts, but also swarms of bees." And a quotation from the siege of Massa: "The besieged having thrown their hives of bees in the breaches, the Crusaders were assailed by this new kind of enemies which annoyed them very much."

Similar "annoyance" was experienced in the fourteenth century by troops of the Sultan of Turkey, while besieging the city of Alba, Hungary. Passages were defended by hives of bees, purposely placed, and "the gravest militia of the Ottoman Empire" refused to advance.

A Portuguese writer of the sixteenth century, relates that in 1513, the army of King Emanuel, besieging a town, after reducing the garrison to dire straits, was "driven away by hives of bees, thrown from the town walls." A quotation also from Montaigne, referring to the siege of Tamly, by the Portuguese: "The inhabitants carried hives of bees, of which they had a wealth, and drove the bees so rudely against the enemy that they abandoned the enterprise."

FRENCH BEES ROUT PRUSSIANS.

In the 1870 war, French bees inflicted a decisive defeat on Prussian troops. The "Journal of Montmedy" describes the incident. The battle of Beaumont, which began by a surprise, owing to the carelessness of the general in command of the French Army. An apiary, in the ground adjacent to the village, and near by 100 hives, arranged in orderly manner, in rows; each covered in as was the custom in those parts, with old clothes, hats, or caps. A charge at dusk by German troops. "Francs-tireurs," in position, without doubt! An opportunity to repay many an old score! The decorated skeps, however, proved more formidable opponents even than "Francs-tireurs."

CRUSADERS' HIVE SLINGERS.

Then we read of an English MSS., still in existence in the Library at Oxford, which " actually describes the mangonels or catapults used in warfare for slinging bees.

Coming down to more recent times, we read of a mishap to a picket of French cavalry, in the war of Hanover, in 1758; the cavalry being quartered near some hives of bees, in an orchard: " One of the horses overturned several of the hives. The bees assailed the men; several horses perished, some of whom, blinded, struck their heads against the walls and the trees."

A NAVAL AUXILIARY.

And, lastly, we read actually of the use of bees in a fight at sea. The date, early in the eighteenth century. A small corsair, with a crew of fifty men, matched against a Turkish galley, manned by 500 men. The larger vessel, boarded by a party from the smaller, and, at the moment of boarding, colonies of bees, in earthenware jars, which had been brought for the purpose, thrown from the masthead of the corsair, on to the deck of the galley. " The bees scattered in all directions. The Turks were so ill-used by them that they thought only of sheltering themselves. But the men of the corsair, who had provided themselves with gloves and masks assailed them with sabres and took the galley almost without resistance."—" Farmers' Advocate."

The editor of the " Farmers' Advocate" adds:—Since the above was written, news has arrived from German East Africa which brings the history of the part played by bees quite up to date. It is reported that the Germans used native hives in the defence of Tanga and when the British troops had landed, fired into them. The enraged bees attacked the soldiers and Sepoys, practically making it impossible for them to advance.

Answers to Correspondents.

ONION-GROWING.

H.F., Imbil—

1. The best method of getting rid of winter weeds would be to fallow the land during the previous winter, working it well up so as to get rid of all weed seeds.

2. In regard to the production of seed, I would suggest planting the original crop much earlier than June—say, about the end of March or beginning of April. This would give the onions a chance to fully mature before the hot summer months, when they would be most likely to seed the following season. This suggestion has been adopted by several growers in the South Burnett with excellent results as far as increased yield was concerned.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR SEPTEMBER, 1916.

Article.		SEPTEMBER.
		Prices.
Bacon	lb.	9d. to 1s.
Barley	bush.	4s. 3d.
Bran	ton	£5
Broom Millet	„	£21 to £23
Butter	cwt.	149s. 4d.
Chaff, Mixed	ton	£2 10s.
Chaff, Oaten	„	£5 10s. to £5 15s.
Chaff, Lucerne	„	£3 5s. to £5 10s.
Chaff, Wheaten	„	£4 5s. to £5 15s.
Cheese	lb.	8d. to 8½d.
Flour	ton	£12 5s.
Hams	lb.	1s. 3d. to 1s. 4d.
Hay, Oaten	ton	£5 to £5 10s.
Hay, Lucerne	„	£4 to £5 5s.
Honey	lb.	6d.
Maize	bush.	3s. to 3s. 8d.
Oats	„	3s 9d.
Onions	ton	£5 10s.
Peanuts	lb.	3d. to 4d.
Pollard	ton	£5
Potatoes	„	£4 5s. to £12
Potatoes (Sweet)	cwt.	3s. 6d.
Pumpkins (Cattle)	ton	£1 5s.
Eggs	doz.	10d. to 1s.
Fowls	pair	6s. to 8s.
Ducks, English	„	5s. to 5s. 3d.
Ducks, Muscovy	„	7s. to 8s.
Geese	„	8s. to 8s. 6d.
Turkeys (Hens)	„	13s. to 14s.
Turkeys (Gobblers)	„	30s. to 36s.
Wheat	bush.	5s.

VEGETABLES—TURBOT STREET MARKETS.

Cabbages, per dozen ... ... (practically unsaleable)	6d. to 1s.
Beans, per sugar bag	2s to 3s.
Beetroot, per dozen bunches	9d. to 1s 3d.
Carrots, per dozen bunches	6d. to 1s.
Cauliflowers, per dozen	1s. to 5s.
Chocos, per quarter-case	1s. 6d. to 2s.
Celery, per bundle	1s. 3d. to 3s. 9d.
Custard Marrows, per dozen	1s. 3d. to 3s.
Vegetable Marrows, per dozen	1s. 3d. to 3s.
Lettuce, per dozen	4d to 9d.
Parsnips, per dozen bunches	9d. to 1s. 3d.
Peas, per sugar bag	1s. 9d. to 4s.
Sweet Potatoes, per sugar bag	1s. 3d. to 2s.
Table Pumpkins, per dozen	1s. 3d. to 1s. 6d.
Tomatoes, per quarter-case	3s. 6d. to 5s.
Turnips, per dozen bunches	4d. to 6d.
Rhubarb, per dozen bundles	6d. to 1s.

SOUTHERN FRUIT MARKETS.

Article.	AUGUST. Prices.
Bananas (Queensland), per case	10s. to 14s.
Bananas (Fiji), per case	15s. to 16s.
Bananas (G.M.), per case	16s. to 17s.
Custard Apples, per tray	4s. to 6s.
Mandarins, per case	8s. to 10s.
Mangoes, per case	...
Oranges (Navel), per case	12s. to 18s.
Oranges (other), per case	7s. to 9s.
Passion Fruit, per half-case	4s. to 4s. 6d.
Lemons (Local), per bushel case	6s. to 10s.
Papaw Apples, per double-case	7s. to 10s.
Persimmons, per half-case	...
Pineapples (Queens), per double-case	7s. 6d. to 9s.
Pineapples (Ripleys), per double-case	5s. 6d. to 7s.
Pineapples (Common) per double-case	5s. 6d. to 7s.
Tomatoes, per quarter-case	2s. 6d. to 5s. 6d.
Strawberries (Queensland), per tray	4s. 6d. to 5s. 6d.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	SEPTEMBER. Prices.
Apples, Eating, per case	9s. to 10s.
Apples, Cooking, per case	7s. 6d. to 8s.
Bananas (Cavendish), per dozen	3d. to 5½d.
Bananas (Sugar), per dozen	1¾d. to 3½d.
Cape Gooseberries, per quarter-case	4s. to 8s.
Citrons, per cwt.	12s.
Cocoanuts, per sack	12s. to 15s.
Custard Apples, per quarter-case	4s. to 5s.
Granadillas, per quarter-case	...
Lemons (Lisbon), per case	6s. to 10s.
Limes, per quarter-case	...
Mandarins, per half-case	7s. to 9s.
Mangoes, per case	...
Oranges, (Navel), per case	9s. to 12s.
Oranges (other), per case	6s. 6d. to 7s. 6d.
Oranges (Seville), per cwt.	10s.
Papaw Apples, per quarter-case	1s. to 1s. 6d.
Passion Fruit, per quarter-case	4s. to 6s. 6d.
Peaches, per quarter-case	...
Pears, per half-bushel case	7s. to 11s.
Peanuts, per pound	3d. to 4d.
Persimmons, per quarter-case	...
Plums, per case	...
Pineapples (Ripleys), per dozen	1s. to 2s.
Pineapples (Rough), per dozen	1s. to 2s.
Pineapples (Smooth), per dozen	2s. to 3s.
Quinces, per case	...
Rockmelons, per dozen	...
Rosellas, per sugar-bag	1s. 6d. to 2s.
Strawberries, per dozen boxes	3s. to 8s.
Tomatoes, per quarter-case	1s. 6d. to 4s.
Piemelons, per cwt.	5s.
Watermelons, per dozen	...

TOP PRICES, ENOGGERA YARDS, AUGUST, 1916.

Animal.	AUGUST. Prices.
Bullocks	£19 12s. 6d. to £24 7s. 6d.
Bullocks (Single)	...
Cows	£12 10s. to £17 10s.
Merino Wethers	38s. 3d.
Crossbred Wethers	38s.
Merino Ewes	24s. 3d.
Crossbred Ewes	24s.
Lambs	30s. 9d.
Pigs (Porkers)	...
Pigs (Slips)	..

EXHIBITION SALES, 1916.

Animal.	AUGUST. Prices.
Bullocks (Champion)	£12
Bullocks (Guessing)	£36
Bullocks	£35 15s.
Cows (Champion)	£25 10s.
Cows	£21 15s.
Sheep (Merino Wethers)	43s. 6d.
Sheep (Crossbred Wethers)	79s.
Sheep (Crossbred Ewes)	34s.
Lambs	46s.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET AT BRISBANE AND THE PHASES OF THE MOON FOR THE THIRD FOUR MONTHS OF 1916.

Date.	September.		October.		November.		December.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·3	5·33	5·29	5·47	4·59	6·5	4·46	6·28
2	6·2	5·33	5·28	5·48	4·58	6·6	4·46	6·29
3	6·1	5·34	5·27	5·48	4·57	6·7	4·46	6·29
4	6·0	5·34	5·26	5·49	4·56	6·8	4·46	6·30
5	5·59	5·35	5·25	5·49	4·55	6·8	4·46	6·31
6	5·58	5·36	5·24	5·50	4·55	6·9	4·46	6·31
7	5·57	5·36	5·23	5·50	4·54	6·10	4·46	6·32
8	5·56	5·37	5·22	5·51	4·54	6·10	4·46	6·33
9	5·55	5·37	5·20	5·51	4·53	6 11	4·47	6 34
10	5·54	5·38	5·19	5·52	4·52	6·11	4·47	6·34
11	5·53	5·38	5·18	5·52	4·52	6·12	4·47	6·35
12	5·52	5·39	5·17	5·53	4·51	6·12	4·47	6·36
13	5·51	5·39	5·16	5·53	4 51	6·13	4·47	6·36
14	5·50	5·40	5·15	5·54	4·50	6·13	4 48	6·37
15	5·48	5·40	5·14	5·54	4·50	6·14	4·48	6·38
16	5·47	5·41	5·13	5·55	4·50	6·15	4·48	6·38
17	5·46	5·41	5·12	5·56	4·49	6·16	4·49	6·39
18	5·45	5·41	5·11	5·56	4·49	6 17	4·49	6·40
19	5·43	5·42	5·10	5·57	4·48	6·18	4·49	6·40
20	5·42	5·42	5·9	5·57	4·48	6·19	4·50	6·41
21	5·41	5·43	5·8	5·58	4·47	6·20	4·50	6·41
22	5·40	5·43	5·7	5·58	4·47	6 21	4·51	6 42
23	5·38	5·44	5·6	5·59	4·47	6·22	4·51	6·42
24	5·37	5·44	5·5	5·59	4·47	6·23	4·52	6·43
25	5·36	5·44	5·5	6·0	4·47	6·23	4·52	6·43
26	5·35	5·45	5·4	6·1	4·46	6·24	4·53	6·44
27	5·34	5·45	5·3	6·1	4·46	6·25	4·53	6·44
28	5·33	5·46	5·2	6·2	4·46	6·25	4·54	6·45
29	5·32	5·46	5·1	6·3	4·16	6·26	4·55	6·45
30	5·30	5·47	5·0	6·3	4·46	6·27	4·55	6.46
31	...	...	5·0	6·4	...	...	4·56	6·46

The Phases of the Moon commence at the times stated below in Queensland, New South Wales, Victoria, and Tasmania.

			H.	M.	
5 Sept.	☾	First Quarter	2	26	p.m.
12 „	○	Full Moon	6	31	a.m.
19 „	☽	Last Quarter	3	35	p.m.
27 „	●	New Moon	5	34	„

The moon will be nearest the earth on the 9th at 11·24 p m., and farthest from the earth on the 21st at 7·36 p.m.

4 Oct.	☾	First Quarter	9	0	p.m.
11 „	○	Full Moon	5	1	„
19 „	☽	Last Quarter	11	8	a.m.
27 „	●	New Moon	6	37	„

The moon will be nearest the earth on the 7th at 8 30 a m., and on the 19th, at 3·12 p.m., at its farthest distance.

3 Nov.	☾	First Quarter	3	50	a.m.
10 „	○	Full Moon	6	18	„
18 „	☽	Last Quarter	8	0	„
25 „	●	New Moon	6	50	p.m.

The moon will be nearest the earth on the 1st at 4·48 a.m , and on the 28th at 5·42 a.m.; it will be farthest from the earth on the 16th at noon.

2 Dec.	☾	First Quarter	11	55	a.m.
9 „	○	Full Moon	10	44	p.m.
18 „	☽	Last Quarter	4	6	a.m.
25 „	●	New Moon	6	31	„
31 „	☾	First Quarter	10	7	p m.

The moon will be farthest from the earth on the 14th at 6·48 a.m., and nearest on the 26th at 10·30 a.m.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise and sunset are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during September, October, November, and December may be roughly arrived at by adding 16 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

Orchard Notes for November.

THE SOUTHERN COAST DISTRICTS.

November is somewhat of an off month for fruit, as the crop of strawberries is about over; pineapples, with the exception of a few off season fruit, are not ready for marketing; and citrus fruits of all sorts, with the exception of those grown in the latest districts, are now over. Bananas should, however, be improving, particularly if the season is favourable.

The most important work of the month is the cultivation of the orchard, as, in order to retain moisture in the soil, it is essential that the soil be kept in a fine state of tilth. Where the land is liable to wash, breaks should be left between the fine-worked land, or, even better, a good break of cowpea or other leguminous crop, valuable for producing nitrogen and humus, should be grown. All fruit pests should be attended to; cyaniding can be carried out where necessary, and is especially useful now in the case of the Red, Purple, Mussel, Circular Black, and Glover Scales. Fruit fly should be systematically fought; all infested plums, peaches, guavas, or other fruits should be gathered and destroyed, so as to prevent the spread of the pest. Sucking bugs of all sorts should be gathered and destroyed, the egg-clusters, as well as the immature and mature insects, being destroyed. Hand-gathering is as good a plan as any. Fig beetles should be destroyed by spraying with Kedzie's mixture; and the egg-clusters should be destroyed whenever found.

Bananas and pineapples can be planted during the month, taking care, in the case of the pineapples, not to set out suckers that will immediately throw out a fruit, but those that will become firmly established before they fruit. Examine the vineyard carefully, and keep it well worked. Look out for Oïdium and Black Spot, and treat for same as recommended in the Orchard Notes of the two previous months.

Early ripening grapes will be reaching maturity towards the end of the month; but few, if any, will he ripe. In any case do not market too immature fruit; rather wait a few days longer, till it is fit to eat.

THE TROPICAL COAST DISTRICTS.

The main crop of pineapples will ripen during the month; and if gathered at the right time—viz., when fully developed, but not turned colour—they will carry all right South, if carefully handled and well packed. Papaws and granadillas are still in season, and will meet with a good Southern demand; they must be packed in cases containing only a single layer of fruit, and should be sent in the cool chamber. I am certain that a good market can be got for these fruits in both Melbourne and Sydney, particularly at this time of the year, when their winter fruits are off and their summer fruits are not yet on.

Watch bananas carefully for fly. Keep the orchards well cultivated.

Only ship good mangoes South; far too much rubbish is sent to Brisbane. Good mangoes will pay to pack properly, but the common sorts, which predominate to an enormous extent, will barely pay freight, if there is a good crop. The canning of good types of fibreless mangoes of good flavour is well worth taking up commercially in the North, as a ready sale for the canned fruits can be obtained.

As in the Southern Coast districts, all fruit pests should be sytsematically fought, and the orchard should be kept in a good state of tilth, as, once the wet season starts, there is little chance of cleaning up weeds and rubbish of all kinds, or of cultivating and sweetening the soil.

THE SOUTHERN AND CENTRAL TABLELANDS.

The earlier kinds of summer fruits, such as cherries, will ripen during the month. See that, if fruit fly makes its appearance, it is systematically fought.

Look out for Codling Moth, and continue the sprayings with Kedzie's mixture.

Look out carefully for any San José scale that may have escaped the winter spraying, as, if the trees are sprayed whilst the young are hatching out, the bulk of the insects are killed and little damage is done either to tree or fruit.

The sulphide of soda spray is one of the best to use now. Keep Woolly Aphis in check, should it make its appearance, using the resin washes; or, if it and San José scale are both present, use the sulphide of soda spray.

Watch the vineyards carefully for Black Spot and Oïdium. Keep the orchard and vineyard well cultivated, so as to retain all the moisture in the soil required for the growth of the tree and development of the fruit. In the warmer parts, irrigate when necessary, following the irrigation by deep and systematic cultivation.

See that grape vines have plenty of foliage to protect the ripening fruit from sun scald, but yet not so dense a foliage as to induce Oïdium or Black Spot. Look out for Red Scale on citrus trees, and cyanide to check same. Look out for fruit fly in the early ripening fruits, and gather and destroy all that may be so affected.

Farm and Garden Notes for November.

FIELD.—Under ordinarily favourable conditions, harvesting the wheat and barley crops may now begin. Those who have oats for hay should cut it when the grain has formed, but before it is ripe, for then the plant is in its most nourishing condition. Destroy caterpillars on tobacco plants, and top the latter so as to throw all the strength into the leaves. Keep down the weeds, which will now try to make headway; earth up any growing crops requiring the operation; sow maize, imphee, setaria, kafir corn, teosinte, sorghum, &c. Plant sweet potatoes, sisal hemp, yams, peanuts, and ginger. Cotton may still be sown in districts not subject to early frost.

KITCHEN GARDEN.—Why do so few gardeners and farmers grow their own vegetables? This is a question frequently asked by visitors to the farming districts. The reason probably is, that vegetables require a good deal of care and attention, which means also a good deal of time taken from the ordinary farm work. In many cases it pays the farmer better to buy many kinds of vegetables than to grow them himself. The only vegetables grown on many fine farms are cabbages and pumpkins, not to class potatoes under the head. Many people have an idea that European vegetables cannot be grown during the hot summer months, but this is a great fallacy; the Chinese gardeners supply the towns with all kinds of vegetables, except, perhaps, cauliflowers, during the whole of the summer. It is, therefore, clear that, by constant work, plenty of manure, water, and some shade for seedlings, most vegetables can be produced during the hot months from November to March. If your ground has been trenched or deeply dug and well worked, the advantages will be seen during the coming months. It does not pay to work shallow-dug ground. When sowing and planting during this month, give plenty of room between the rows and the plants; otherwise they will be drawn up and worthless, and keep the ground open by constant forking and hoeing. Thin out melon and cucumber plants. It is a good plan to peg down the vines; they will then not be blown about by the wind; they will take root at intervals, and thus help the main stalk. Give plenty of water to tomatoes planted out last month. They should also be mulched. Sow cabbage, French beans, melons, lettuce, radishes, pumpkins, cucumbers, marrows, rosellas, &c.; and transplant for succession in calm cloudy weather.

FLOWER GARDEN.—Stake any dahlias which may be now above ground, and plant out the bulbs which were stored, in a moist place. If the weaker bulbs are reserved, they will come in for autumn planting. Take up all bulbs which have done flowering, and store them in a dry place. Winter-flowering plants will have gone off almost; still, the garden should be in full bloom, and will well repay the trouble bestowed on it, and a little fertiliser given as a top-dressing will assist the plants to bloom and look well for a longer time than if they were neglected. Give weak liquid manure to chrysanthemums, and allow no suckers to grow till the plants have done flowering. Take up narcissi. Do not store them, but plant them at once in new situations. Sow antirrhinum, balsam, zinnia, summer chrysanthemum, calliopsis, and nemophila.

QUEENSLAND AGRICULTURAL JOURNAL

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Agriculture.

IMPORTANT TO PROSPECTIVE COTTON-GROWERS.

The following instructive article, entitled "Striking Phases of the Cotton and the Mill Industry," which appeared lately in the "Manufacturers' Record," was republished in the "Cotton and Cotton Oil News" (Texas, U.S.A.) of 21st August last, and. as will be seen, it draws attention to the rapid increase of cotton consumption in the Southern States, the great increase in the world's demand for cotton, and the great need for building up new supplies in other parts of the world. What other part of the world presents a more favourable or vaster field for the cotton-growing industry than Queensland? We have tens of thousands of acres of splendid cotton soils, we have an ideal climate, just suited to the cotton plant, and long ago it has been proved that the yield of cotton per acre, in all parts of the State where it has been grown on a commercial

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scale, is almost double that of any other cotton-growing country. Yet the British Cotton Growing Association passed by Queensland, and spent thousands of pounds sterling in establishing the industry in black labour countries. Had a very small proportion of this money been employed in establishing it in this State, Queensland would to-day have been an exporter of thousands of bales of cotton. Had cotton been planted instead of wheat during the past drought year, there would have been none of the losses then experienced by farmers. We repeat that in view of the certain shortage of cotton this season in the United States the prospects for growers in this State are excellent. It may incidentally be mentioned that a locally invented cotton-picking machine will probably be on the market by next picking season, trials having shown that it does its work well and rapidly, and it has the additional recommendation that it will be cheap as well as effective, and so within the reach of every cotton-grower:—

"The review of the cotton crop and consumption for the commercial year ended with July, 1916, contains more strikingly interesting facts than any review of any preceding crop. It shows that the Southern mills are now consuming over 4,000,000 bales of cotton a year, or more than 1,000,000 bales in excess of the consumption of American cotton in all other mills in the United States. While all mills outside of the South increased their consumption of American cotton by 387,000 bales over the preceding year, Southern mills recorded an increase of 884,000 bales, or an actual gain considerably more than twice as great as the gain in Northern mills.

"Another significant fact of world-wide interest is that American mills took 48 per cent. of our last year's cotton crop as compared with 39 per cent. in 1914. It is not to be wondered at, in view of this rapid increase in home consumption of American-grown cotton, that the English spinners are seriously alarmed at the outlook.

"Mr. J. A. Hutton, chairman of the British Cotton Growing Association, was recently quoted as calling attention to the fact that Lancashire is dependent upon America for nearly 84 per cent. of the cotton to feed its spindles, and that while the number of spindles has increased in the Lancashire district from 43,000,000 to 60,000,000 during the last twenty years, there has been a steady decline in the percentage of American cotton available for English mills.

" 'We are,' said Mr. Hutton, 'no longer obtaining the same proportion of the crop. In the period from 1890-95 Great Britain took 36·5 per cent. of the American crop and the Continent 30·5 per cent., while the United States' consumption was 31·1 per cent. For the period from 1910-15 Great Britain took 25·6 per cent. of the crop, a decrease of 9·9 per cent.; the Continent, 35·9 per cent., an increase of 5·4 per cent., while the United States' consumption was 37·1 per cent., an increase of 6 per cent.'

"After referring to the rapid increase of cotton consumption in American mills, Mr. Hutton added:

" 'The demands of the world for cotton are going to increase, and particularly in America, which country, thanks to the war, is now getting a very strong hold on the export trade. This means that every year, when supplies are short, there is going to be a scramble for cotton, and we can be quite sure that America will not go short, and that Great Britain, as the next largest user, will be the largest sufferer.

" 'The situation is one to cause the gravest anxiety. I do not think one can exaggerate its seriousness. Unless we can build up new supplies in other parts of the world, I can see most serious losses facing the Lancashire cotton trade, and it may be that Lancashire will permanently lose a very large portion of our export trade. If that should happen, many of our mills will have to close, and a large proportion of the population must emigrate.

" 'We have, therefore, not merely to discover and develop new sources of supply, but we must also pay particular attention to the countries which can produce long staple cotton. The British Cotton Growing Association has fully proved that all the cotton Lancashire requires can be grown within the Empire. It is merely a question of time.'

"American cotton growers and manufacturers must bear in mind that, though England has for seventy-five years been endeavouring to expand cotton cultivation in other countries, in order to lessen its dependence upon the South, it will put into this work far more effort and expense in the future than it has ever done in the past. Heretofore it has been somewhat of an academic question, and, while leaders in the industry have been active in urging the growing of cotton in Africa and elsewhere, henceforth the energy of the whole Empire will be concentrated upon creating new sources of supply to meet the decreasing quantity from the South. Thus, this section will have a very much more active rivalry in the future in cotton production than it has had in the past. It should, therefore, by every means possible, increase the fertility of its soil, intensify and diversify its agriculture, with a view to raising at home its foodstuffs and to increasing its cotton production at a lower cost and, if necessary, on a smaller acreage. This is entirely feasible, and would, if carried out, materially assist the South in continuing its supremacy in the world's cotton production.

"Two items of exceptional interest in Colonel Hester's report are that the value of the cotton seed for the past year was 192,500,000 dollars, as compared with 92,000,000 dollars seven years ago, although the crop of that year was larger than last year's, and that the value of linters, which two years ago averaged from 1¾ to 2 cents per lb., increased during the past year to an average of over 6 cents per lb.

"The total value of last year's cotton crop, including seed, was 958,200,000 dollars, or, in round figures, nearly 1,000,000,000 dollars, gathered by the cotton-growers of the South for this royal staple.

"The consumption of linters in Northern and Southern mills amounted to 913,539 bales, as compared with 395,373 bales in the preceding year.

"During the year there was an increase of 460,066 spindles in the South, and there were at the close of the year 405,614 spindles in course of erection and being added to old mills.

"The year was one of great prosperity in the Southern cotton-mill industry. It atoned partly for the long years of depression, and placed this industry once more on a sound financial basis, free from some of the difficulties under which it laboured during the years of depression in the cotton-mill industry."

COTTON NOTES.

From American exchanges we gather the following information as to the condition of the present cotton crop and the prices ruling and prospective for cotton. The price offered for cotton-picking in Texas on 28th August reached the dollar mark for 100 lb., equivalent to ½d. per lb. Hundreds of pickers left town for the fields, and dozens of wagons were lined up on the streets waiting to be loaded. Many were unable to get pickers at this advanced price.

Cotton may go to 25 cents (over 1s.) per lb.

Further deterioration of the growing crop during August reduced the estimated final production by 1,116,000 bales, to a total of 11,800,000 bales, as against 16,000,000 bales in 1911 and 1914. The crop is unquestionably short, the result of a Gulf storm in South Texas, the boll weevil, incessant rains, &c.

The prospective average lint yield per acre is now 164 lb.

Good grades of cotton in Mississippi have been bringing 20 to 23 cents (10d.—11½d.) at Granville. Predictions of 30 cents. (1s. 3d.) per lb. are freely heard.

Four hundred bales of cotton marketed at Temple, Texas, realised nearly 40,000 dollars (about £8,000), or 100 dollars (£20) per bale. Two years ago the same amount of cotton would have brought about 16,000 dollars (£3,200). Farmers are jubilant over the high prices, and are selling as fast as they can get their cotton to market.

Events clearly forecast that there will be a tremendous demand for cotton as soon as the war ends.

England's outlook for cotton is ominous. The increasing consumption of American cotton by American mills is fraught with the greatest consequences to the spinning industry of the Old World, especially of England. Should the war last for another year, the American mills will be consuming two-thirds of the American crop, and American spinners will be satisfied before the needs of the Old World spinners.

Where is the cotton to come from during the next twenty years? The development of a new source of supply in some other country in the near future is extremely improbable.

Thus far from our American exchanges. The position is very clearly set down as regards future supplies for Great Britain. It has long ago been shown that Queensland can grow all the cotton required by the world if the rural population would take up the industry. Here we have no boll-weevil, no cotton-stainer or other pest. The boll-worm is easily controlled. We have no devastating hurricanes; we have an ideal climate from South to North and in the West for the cotton plant; we have a quite sufficient rainfall for all the needs of the plant from sowing to picking time, and it may be even affirmed that cotton in a large portion of the State will grow and bear well all the year round. We also have a rural population, practically every one of whom owns his own farm, where heavy crops of various kinds are raised, some often failing owing to making heavier demands on cloud water than the clouds can supply, which is not the case with a cotton crop. We have an Agricultural Department which goes to the trouble and expense of importing the best varieties of cotton seed for gratuitous distribution; which offers cotton-growers a good advance on all seed cotton sent to the department's ginnery, with a guarantee to distribute all profits on the sale of the cotton amongst the suppliers. Yet the voice of the charmer falls on deaf ears. The farmers are conservative and stick to the standard crops, even although they may frequently fail, rather than do what the last generation did—produce a crop which defies adverse seasons, which requires small attention, and which will yield greater profit per acre than most crops which are usually produced.

If cotton were as extensively grown as it might and should be, oil-mills would soon be established, and cotton-spinning mills as well, thus adding two additional industries giving employment to large numbers of men and women. There is apparently a boom time ahead for the cotton industries, and we would advise farmers all over the State to take advantage of the chance now offered to obtain good seed, and devote at least 5 acres each to a cotton crop.

PLANTING POTATOES ON NEW LAND.

At the time when the Queensland potato crops were devastated by Irish blight, many held the opinion that if disease-free potatoes were planted on new land they would not contract the disease. In the "Journal of Agricultural Research," United States Department of Agriculture, 10th July, 1916, there is an article by O. A. Pratt, Assistant Pathologist of the Bureau of Plant Industry, on experiments with clean seed potatoes on new land in South Dakota. The writer of the article states that it has generally been assumed by plant pathologists that if disease-free potatoes were planted on new land, the resulting potatoes would be free from disease, and pathologists and potato-growers believed that in the new land just reclaimed from the desert there would lie a wonderful opportunity for the production of disease-free potatoes. It is found, after an investigation lasting one year, that planting clean potatoes on new land did not guarantee a disease-free production, and, second, that a smaller percentage of diseases might appear in the production when clean seed was planted on lucerne or grain land than when similar seed was planted on virgin or raw desert land. In these experiments all precautions were taken against planting diseased seed, and after cutting, the tubers were disinfected for one and one-half hours in a solution of mercury bichloride.

BROOM MILLET FOR PROFIT.

At a meeting of farmers at Clovass, N.S.W., writes "Town and Country," a discussion took place on the relative merits of broom millet and maize. One farmer considered 10 cwt. per acre of broom millet a good average crop for the district, but in some parts a yield of 15 cwt. had been recorded. Any soil that will grow good maize will grow millet, and should be cultivated for millet the same as for maize. The average price per ton for millet was £30. After harvesting the first crop, if the stalks were cut down, the second growth would, in his opinion, yield as well as the first, giving for the season a total of about 1 ton from an acre—a return of about £30 per acre.

The same journal also draws attention to the neglect of grading the hurl by the growers to their own disadvantage.

It should be the object of the grower to produce long, fine, straight brush, or "hurl," as it is called. This is generally effected by bending the heads over, when the weight of seed in maturing will cause the brush to lie close and straight. The turning must be done between the joints, because if done on the joints the stem will snap, and the head will die off. This operation is performed when the seed is beginning to fill out and the brush shows signs of spreading. The time to harvest will depend on the weather and the colour required. Manufacturers of brooms prefer a millet with a green tinge, and this is obtained by cutting when the seeds are in the "dough" stage. The brush is then fully developed, but the grain is soft. Bent brush is the least valuable. Colour is also a factor affecting the market price, and, as stated, brush baled ungraded —*i.e.*, broken, bent, and worn brush mixed indiscriminately—brings the lowest price in the market. Owing to these faults manufacturers find that it pays them better to pay £40 a ton for Italian millet than to use badly-grown, ungraded, discoloured local material at £25. The remedy lies in the growers' own hands.

A Southern journal, early in last October, stated that "prime long hurl was selling at £33 to £34 a ton, and only odd lots were £35; whereas a few weeks ago £35 was paid with fair freedom. Seconds were £26 to £31; short, crooked, and discoloured, from as low as £16. It is to be regretted that the get-up of a large percentage of the New South Wales broom millet for the wholesale market is faulty. This neglect means a monetary deduction from the cash returns to the farmer, and also tends to the disparagement of the reputation of New South Wales bales in the interstate markets. Letters to Sydney from Melbourne, Hobart, Launceston, Dunedin, Christchurch, and Auckland show that the importations of broom millet from the United States and Italy, from time to time, are largely due to the careful manner in which the bales from both these countries are graded and made up. Before the war, during seasons when this line was abundant in Italy, the names of the Italian senders had so good a repute in Sussex street that their parcels were accepted here on sight, without question, thus saving delay and expense in examining the bales. It is satisfactory that the few New South Wales growers who used to make false weight with earth, stone, millet-seeds, and other rubbish, have ceased this practice; but a frequent lack of care in grading makes it necessary to pull to pieces many New South Wales bales destined for Victorian, Tasmanian, or New Zealand use, in order that the millet may be regraded. This grading, to be faithfully done, requires time, and it is opportune for New South Wales growers to note that the necessary time is not grudged by the United States or Italian farmers.''

BONES FOR MANURE.

Bones, which when properly treated form a valuable fertiliser, may be readily reduced to powder without the aid of a crushing-mill. A simple plan is to pack the bones, layer by layer, with fresh wood ashes in a barrel, and keep the mixture moistened for some months. A quicker method is to boil the bones in an iron or copper boiler with strong caustic lye. The proportion of bones and lye to be used is, roughly, 15 parts by weight of bones to 5 lb. by weight of caustic soda, or 7 parts by weight of caustic potash dissolved in 15 parts by weight of water. The boiling should be done for two or three hours. But even without boiling, the bones will become disintegrated by being simply kept in the caustic liquor for about a week. Another method of softening bones is by mixing them in heaps with quicklime and loam. A layer of loam 4 inches deep is first spread, and on this is placed a layer of bones 6 inches deep, and above this a layer of quicklime 3 inches deep. The layers of loam, bones, and quicklime are repeated till the heap reaches a convenient height, when it is covered all over with a thick layer of earth. Holes are then bored in the heap from the top, and water poured down them to slake the lime. This mass will become hot, and remain so for two or three months, after which the bones will become friable, and the whole heap may then be mixed up and spread as manure on the land.

JUVENILE CORNGROWING COMPETITION, 1916-17.

1. This competition will be open to all under the age of eighteen years who are residents of the State of Queensland. An entrance fee of 2s..6d. must be forwarded to the Under Secretary with the application to enter.

2. Applications to be enrolled in the competition, containing the following particulars, must reach the Under Secretary, Department of Agriculture and Stock, Brisbane, not later than 12 noon on the 28th October, 1916:—

(*a*) Full name and address. (Give christian names in full.)
(*b*) Date of birth. (Day, month, and year.)
(*c*) No. of Division in which applicant resides, and the name of the Dairy Inspector who supervises the locality.

3. The area to be devoted to the planting of the seed maize shall be one-tenth of an acre, selected seed for which will be supplied free of cost; but one parcel only will be supplied to each competitor during the period of the competition.

4. Each competitor shall have absolute freedom in his choice of ground, and in the methods he may adopt in preparing, planting, and cultivating his plot; but in no case shall a plot exceed one-tenth of an acre. Yields will be calculated, when judging, on the basis of this area.

The following table shows the length the rows must be to give the exact area according as four, five, six, or more rows are planted:—

Number of Rows 4 feet apart.	Length of Rows in Feet.	Number of Rows 4 feet apart.	Length of Rows in Feet.
4	272 feet 3 inches ..	8	136 feet 1½ inch
5	217 feet 10 inches ..	12	90 feet 9 inches
6	181 feet 6 inches ..	16	68 feet
7	155 feet 7 inches ..		

5. Each competitor will be required to keep a record chart showing the dates and particulars of the different stages of work, and these charts must be delivered, at the time of harvesting, to the officer appointed for superintending and verifying the yield, and this officer will post them on to Brisbane.

6. Within seven days from the verification of the yield from the crop, each competitor shall select, without aid from other persons, twelve uniform cobs of the maize from his crop, and forward them, with a letter of advice, to the Department of Agriculture and Stock, Brisbane. (The cobs should be packed in straw envelopes, commonly used in packing beer bottles, and then placed tightly in a case which should be labelled and branded with the initials of the competitor and the number allotted to his district.)

7. Competitors must notify the Dairy Inspector for the district of the date when the crop shall have matured and be ready for inspection. The maize must be thoroughly dry and ripe when harvested.

8. No competitor shall be allowed to employ or permit any labour upon the competition plot standing in his name, other than his own personal labour, excepting in relation to the driving of horses, for which, owing to circumstances, such help may be needed.

9. The competition will close on the 30th June, 1917, and the prizes will be allotted thus:—

The competitors will be grouped according to the following divisions:—

(1) The district supervised by—
Mr. F. B. T. Koch, Dairy Inspector, Beenleigh.
Mr. H. C. Gordon, Dairy Inspector, Harrisville.
Mr. R. K. Henderson, Dairy Inspector, Rosewood.

(2) The district supervised by—
Mr. C. C. Pickering, Dairy Inspector, care of Miss Macpherson, Montague road, South Brisbane.
Mr. R. G. Ridgway, Dairy Inspector, Ellerslie Crescent, Taringa, Brisbane.
Mr. R. Winks, Dairy Inspector, Gympie.
Mr. F. J. Watson, Dairy Inspector, Bundaberg.
Mr. W. S. Harding, Dairy Inspector, Esk.

(3) The district supervised by—
Mr. J. H. Barber, Dairy Inspector, Crow's Nest.
Mr. J. P. Carey, Dairy Inspector, Gatton.

(4) The district supervised by Mr. S. K. Crowther, Dairy Inspector, Kingaroy.

(5) The district supervised by—
Mr. J. J. Carew, Dairy Inspector, Russell street, Toowoomba.
Mr. L. Verney, Dairy Inspector, Newtown, Toowoomba.
Mr. J. R. D. Munro, Dairy Inspector, Warwick.

(6) The district supervised by Mr. C. Queale, Dairy Isnpector, Gayndah.

(7) The district supervised by—
Mr. J. Cattanach, Dairy Inspector, Dalby.
Mr. R. S. Sigley, Dairy Inspector, Roma.
Mr. W. R. Holmes, Dairy Inspector, Goondiwindi.

(8) The Central ditsrict of Queensland, including that supervised by Mr. H. T. Deighton, Dairy Inspector, Rockhampton.

(9) The Northern district of Queensland, including that supervised by—
Mr. G. A. Smith, Dairy Inspector, Mackay.
Mr. S. A. Clayton, Dairy Inspector, Yungaburra.

If there are more than ten competitors in any division, three prizes will be awarded for competition in that division; less than ten competitors, one prize only.

The prizes shall be of the following value:—First, £5; second, £2; third, £1.

No money prizes will be given, but each successful competitor will be allowed to select some article to the value of his prize.

The prizes awarded in any division may be increased in number and value by donations from persons, firms, or societies who may be interested in the competition.

10. Three special prizes of the value of £10, £5, and £3 will be awarded to the competitors who stand first, second, and third in the entire competition.

These prizes may be increased in number and value in the same way as indicated above in connection with the divisional competitions.

No prize will be awarded unless the yield of corn equals 20 bushels per acre. This stipulation may be waived under very exceptional circumstances in the case of a lower yield.

11. The aggregate points will be 100, and the judging will be based upon the following:—

(*a*) Quality of the maize produced.
(*b*) Yield of plot.
(*c*) Notes and records of plot.

12. The Director of Agriculture will be the sole judge of the competition, and his decision shall be final.

WILLIAM LENNON,
Secretary for Agriculture and Stock.

Brisbane, 1st October, 1916.

A HINT TO COMPETITORS IN THE CORNGROWING COMPETITION.

We fear it is rather late to make a few suggestions to the competitors in the corngrowing competition as to the preparation of the land for maize-planting. Still, it will be well for future competitors to bear in mind a few facts concerning the requirements of the maize plant. Experiments have shown that the roots will strike downwards as far as 8 ft., yet the main bulk of the roots generally develop at the depth of 8 in. In experiments made in the United States of America, it was found that a dense network of feeding roots, reaching from row to row, completely permeated the whole soil area below the cultivated portion, and that the fourth inch of soil contains a larger amount of roots than the 3 in. above it or the 4 in. below it, and nearly as much as both together. There are some who advocate deep cultivation, but the result of fifty-six tests at seventeen Agricultural Experiment Stations in America have shown an average increase of 42 per cent. resulting from shallow cultivation as compared with deep cultivation.

Some confound the expressions deep ploughing in the preparation of the land with after-cultivation. In the preparation of the land, on which the success of a corn crop largely depends, deep ploughing to a depth of 9 or 10 in., and subsoiling down to 18 in. or 20 in., is shown by the root system to be advantageous, the subsoil, of course, not being brought to the surface. Thus a reservoir of moisture is constructed for the future use of the roots. The ground having been thoroughly prepared should, in about August, be cross-ploughed and well pulverised with a strong cultivator set first to 8 in., and then crosswise to 10 or 12 in. deep. The main thing before planting is to secure a perfect tilth. For after-cultivation, there is nothing equal to a careful and thorough harrowing by means of lever harrows with the teeth slightly standing backward. If this work is properly done, not one young plant in a thousand will be injured, and all the rest will be greatly benefited, as the pulverisation of the soil at the young stems will facilitate the formation of roots, give increased circulation to them, and, consequently, quick, vigorous growth. Never be afraid to run the harrows over the young seedling corn. Later on, scarifiers may be used, but only at shallow depths. After this, the crop may be left to itself.

There are few plants which benefit more (or to which it is more necessary) by a well prepared seedbed than maize. Generally, the land is ploughed to a depth of 8 in., but after the plants are up, shallow cultivation, as we have shown, follows, the deep ploughing before planting being necesary to break up the subsoil and form a reservoir of moisture for the nourishment of the plants.

IMPROVEMENT IN COTTON VARIETIES BY SELECTION.

It has frequently been shown that, no matter how pure the seed of the cotton boll may be when first planted, yet variations will occur in the resulting crop, due to various causes, such as removal from a higher latitude to a lower, or *vice versa,* from a rich to a poorer soil, or the contrary; again, from a wet to a dry soil, or the other way about. Any of these changes may bring about a variation; in fact, changes of some kind are sure to take place, inasmuch as it is seldom that two plants resemble each other in all respects. Probably no one ever grew a dozen plants, even from one pod of seed, which all resembled each other without some difference, however slight. In cotton cultivation, it is important to obtain uniformity of the staple in regard to length, strength, and texture. A mixture of long and short staple, fine and coarse texture, weak and strong fibres, is detrimental to the prices ruling for good samples in the market.

On this subject of selection a very useful paper was read some time ago at an Agricultural Conference at Bundaberg by Mr. E. Grimley, which will bear reprinting, and which should be carefully read and noted by those who intend planting the new, pure varieties of seed imported this year by the Department of Agriculture and Stock.

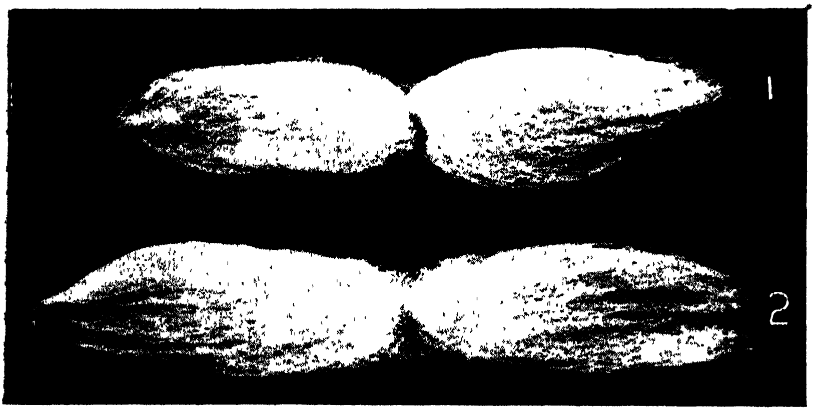
WHAT IS SELECTION?

" It is taking advantage of the natural capacity of all plants to vary in some particular," or, as Darwin puts it, it is "the law of preservation of the favourable individual differences and variations, and the destruction of those which are injurious."

We will consider what are the main points which constitute a valuable crop of cotton—probably length of staple and quantity of lint per acre are the main points to be considered. Taking length of staple first—there are several points in judging the staple or fibre—not length alone. There is uniformity of length, silkiness, lustre, twist, and strength. All these have to be considered when judging which is the best form of fibre to perpetuate. Nearly every cotton plant will differ one from the other, some superior in one direction, some in another, and it will be by judging your mother plants by points, giving so many points for each degree of excellence, working up to your standard, that your ultimate choice will fall on that plant having the greatest number of points. As an example, I will give you some information gathered from American sources of results of experiments carried on towards the improvement of sea island cotton.

Gossypium Barbadense, getting its name from the island of Barbados, or, as it is popularly called, sea island cotton, is generally grown near the coast in the United States, not being suitable for growing in the interior, like *Gossypium herbaceum,* or uplands cotton; it was generally grown as a perennial, and for a long time was entirely unsatisfactory, giving but poor returns. However, by carefully selecting early-maturing seed and practically changing it from a perennial to an annual, by selecting the best seed, and by better cultivation, a new race has been evolved, and it was at this point, when American sea island cotton was the best in the world, that a gentleman named W. A. Clark determined to try and make a still further improvement in the quality of the staple, and by applying the principle of selection he has so far succeeded that he is now obtaining as much as from 50 to 60 cents per lb., or 2s. 6d. to 3s., for his cotton, the usual price being from 25 to 30 cents per lb., or 1s. to 1s. 3d. His plan of operation was as follows:—He carefully went over his fields in a rough manner, marking each plant appearing to be superior to the others; later, each of these marked plants was subjected to a more careful examination in the field, and the number was reduced to five, and the bolls of fibre and seed were picked and reserved for future and more minute examination. Points were then given to each for its good qualities, and ultimately the palm was given to one plant; but before decision a sample of the fibre was sent to the manufacturer for his approval, who examined it microscopically, and reported thereon. A final decision having been made, the seed was planted at the right time, the seeds from a single plant being about 500 in number. The result of these 500 plants gave enough seed for 5 acres the following year, and the 5 acres the next year gave enough seed for the general crop.

The plants grown from the 500 original seeds were inspected and subjected to the same tests for further crops, it being found that any neglect to select caused a rapid decline in quality; in fact, there was a reversion to the original quality before selection, so that to keep up the quality the process must be continuous. This quality of cotton secures orders from the manufacturers direct, without being sent to the open market, and quotations for such do not appear in the trade lists. To give an idea of the advancement made by these experiments, I give a few illustrations:—



No. 1 is the ordinary sea island cotton, whilst No. 2 is the sea island improved by selection. You will notice that the staple in the selected cotton is much longer, but the other qualities, such as silkiness, softness, twist, and strength, cannot be reproduced. No. 3 is a sample of sea island cotton grown in Queensland, by which you will see that there is plenty of room for improvement by selection.

In choosing the mother plant for seed it is necessary to take into consideration not only the value of the staple, but also the general condition of the plant—its healthiness, its productiveness, its general all-round suitability—in other words, it is no use picking out one particular boll of exceptional merit and expecting that the seedling plants will resemble its parent; it being now an accepted fact that the seedlings will resemble the general characteristics of the parent, and not the characteristics of one boll or branch. I am now speaking of seedlings, but in the event of one branch showing a special character worthy of being perpetuated, it would be as well to strike that branch from a cutting, and if in the second year the character is forthcoming, to continue the process for four or five years, and in all probability the seed would then carry the character and become fixed, to use a gardening term.

Then, again, as to increasing the quantity per acre, which in its way can probably be made as profitable as improving the quality of the fibre. It is known that this is being done in the States, not only by high cultivation but by selection; certain seeds are enveloped by a larger amount of lint than others, and by careful selection these can be secured; this has been done to such an extent that the proportion of lint in sea island cotton is now as one to three, whereas before selection was brought into action it was one to five; then certain plants are very much more floriferous than others and naturally carry more lint—these can be marked and secured; it has also been found that the lower half of a cotton plant will give you seed which will give larger returns than the upper.

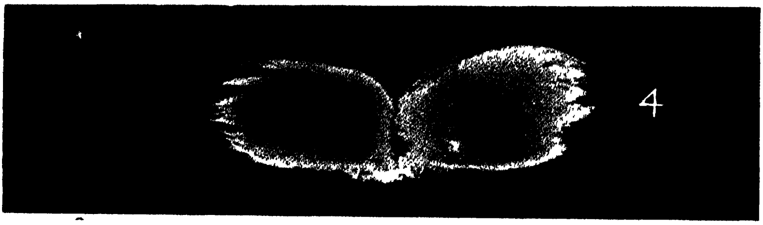
In dealing with the question of increasing the quantity per acre, I have left out of consideration the fact that there are some varieties of cotton now available which give greater returns than others; for instance, one variety of Egyptian cotton is shown to give 500 lb. to the acre, but how far this is attributable to the system of irrigation carried on in Egypt I do not know; moreover, this variety of cotton requires less irrigation than others. Is not that a point that can be utilised—a variety that does not require as large a rainfall as others might be grown in districts where the fall is light? It is also to be considered whether it would not be advisable to try to alter the maturity of the plant to an earlier or later period; for instance, a plant which will mature its crop before the rainy season sets in would be advantageous, or again, if the crop ripens after the rains are over, it would be a gain, as those who have grown cotton in the old days can remember only too well how the crops were spoiled by the rain, the seed in the boll beginning to grow and yellowing the lint, or if secured, the material fermented for want of proper drying.

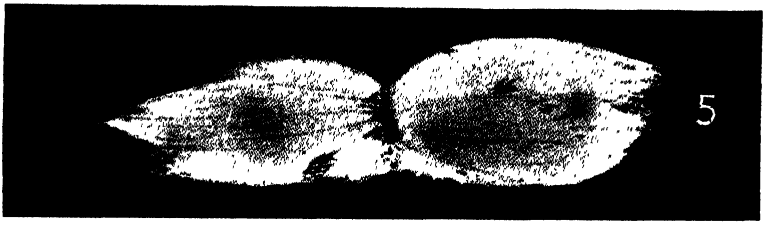
So far, this paper has dealt only with the improvement of cotton by the process of "selection," but there is still another mode of improving cotton, and that is by cross-fertilisation or hybridisation.

To quote from the Year Book of the Department of Agriculture of the United States, to which publication I am greatly indebted for information contained in this paper, "selection when used alone in the improvement of plants depends upon the adding up of small unimportant variations through many generations, which in the end may give marvellous results; but by this method the breeder has no means of forcing any change, but must be satisfied with slight variations and long-continued selection. However, when marked changes and new creations are desired, it is to hybridisation that attention must be turned. In the words of Henri de Vilmorin, "cross-breeding greatly increases the chance of wide variation, but it makes the task of fixation more difficult.' It, however, gives the raiser the only means in his power to unite in one the qualities of two different plants while discarding the weak points."

The attempt to produce a hybrid has been tried by the same Mr. Clark who carried on the selection improvements, and I will now give his experiences. It is obvious that it would be useless to endeavour to obtain a greater length of staple only to be spoilt by the saw gin used in uplands cotton. So Mr. Clark, knowing that a variety of uplands called "Peterkin" sometimes has bolls with free seed, or comparatively so, carefully watched for some of these seeds, and sowed them; the following year a larger proportion was free, and by selecting for four years he obtained seed that was all free. The object was to obtain a variety that combined the robustness of the upland with the freedom of seed and the greater length of staple of the sea island, and Mr. Clark then crossed or hybridised the free-seeded uplands, which he called "Klondyke," with the sea island. How far the experiment was a success can be gauged by the illustrations.

No. 4 gives you an example of uplands cotton, whilst No. 5 gives a drawing of the new hybrid between "Klondyke" and sea island. You will notice a great improvement on Klondyke—greater length of staple with free seed. As this hybrid has but very recently been produced its commercial value is not known, but in all probability it is of great value. In No. 6 I give an illustration of Queensland uplands cotton, which again, as in the sea island variety, shows that there is ample room for improvement by either the process of selection or hybridisation. I do not think any attempt has been made in Queensland to improve the quality of cotton in any direction, but I am convinced that it will be only by the application of the two principles advocated, either singly or together, that we can hope to reintroduce the cotton industry. I may mention incidentally that the society I have the honour to represent at this Conference has decided to attempt this important work; that they will be successful in producing a variety which will give a good return to the acre as well as an improved quality of lint is warranted by the success obtained in other countries, and when we look round and remember how nearly everything now grown has been improved, how the apple of our days is descended from the crab, how the cabbage of 30 lb. weight is the result of "selection" during centuries from plants that weighed not more than a few ounces, how wheat has been improved, how beet sugar has trebled its percentage of sugar, surely we may expect the same improvement can be made in cotton, and before many years I hope to see Queensland cotton quoted on the European market—not as a variety of uplands or sea island, but as a distinct variety that has been evolved by the skill and cleverness of our farmers, and if it should happen that the Queensland Acclimatisation Society should lead the way, there is still plenty of room for others to follow.

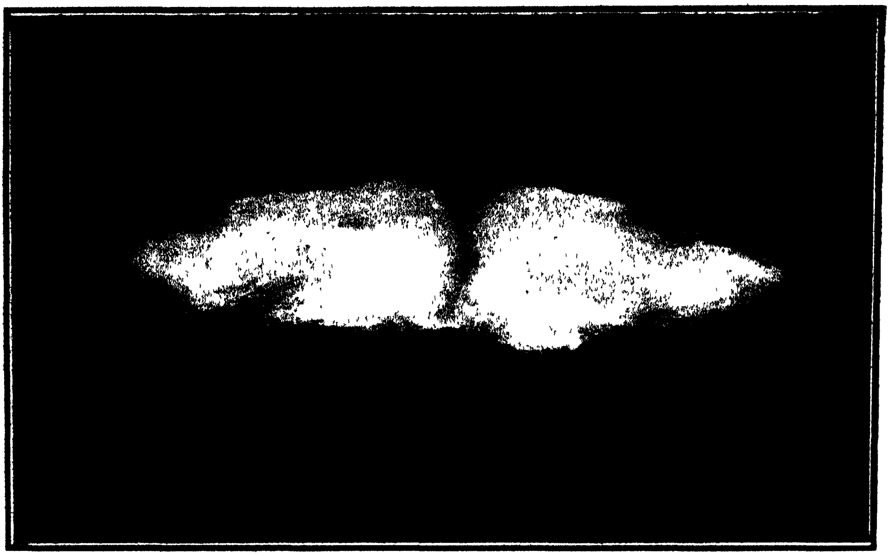




In concluding my remarks, I would like to say that I think if any revival takes place in the cotton industry, it will not take the form of a profitable speculation for the capitalist, but will probably take a place amongst the mixed farming of the man who tills his own land, and who can command sufficient labour for picking from his own family and the families of the few hands he may employ.

I hope that I have made my paper sufficiently plain to those who take an interest in cotton, and if any amongst you should decide to take the improvement of cotton in hand, I shall be sufficiently rewarded.

No. 7 depicts a variety which at first was classed by two Queensland cotton experts as sea island, but closer examination shows that it is more like Mr. Clark's hybrid "Klondyke," some seeds of which found their way to Queensland some years ago. This cotton was forwarded to us by Mr. W. Schafer, in the Burnett district.—Ed. "Q.A.J."



GINSENG.

Some years ago we published several articles on the cultivation and value of Ginseng, one of which we reprint in this issue. The "New Zealand Farmer," for October, 1916, writes, under the caption "Worth £5,000 an Acre," as follows:—

"A crop that is declared to be worth so colossal a return as £5,000 an acre will surely attract attention in countries looking around for new industries. Even if one has to use a little salt to discount, there is still left a handsome result. This is said to be the return from a product called ginseng, used for medicinal purposes. The Americans got hold of the idea to raise the plant in recent years, and as a result roots of it for seed purposes sold as high as 25s. to 35s. each. China seems to be the great market for it, where there is wanted annually up to £5,000,000 worth. Mr. H. V. Edwards, of Bega, N.S.W., has just issued a booklet dealing with the product, in which he points out that very little work is required in raising. While he does not give the return so high as £5,000 an acre, he says he has seen £80 worth produced on a plot 16 by 32 ft. An American authority says it can be raised on any but wet ground. The land must be well drained. Shade is an important condition, it would appear. Attention to the crop during its growth is no more arduous than that required for vegetables. The Chinese claim that as a medicine ginseng stands high as a restorer of fatigue, to invigorate the feeble old, and to brace up the weak. Some readers may be inclined to treat this matter as a joke, but Mr. Edwards is a reputable citizen. Here in these countries we mostly import all our drug plants. It is the result of our following up callings which require a lot of land. There are really few husbandmen amongst us, as they know them in the old-world countries. But if we are to become economically progressive, and independent of outsiders, there must be a revolution in our methods. Departments of Agriculture would take a wise step if they introduced an expert in the culture of plants of this sort for obvious reasons."

In 1906, the Department of Agriculture of this State (Queensland) secured some ginseng seed from the Tokyo Plant, Seed, and Implement Company, Japan, which was sent to the Kamerunga State Nursery, but failed to germinate. This was possibly owing to the climatic conditions of the North of Queensland, as we are informed that the plant is indigenous to and is only cultivated in countries subject to severe winter conditions such as occur in Korea, Japan, and New York State.

GINSENG CULTURE.

Seven thousand pounds per acre for a crop seems an incredible return, yet it is quite within the bounds of possibility. There is a root called "Ginseng," which is highly esteemed for its medicinal properties by the Chinese, who give enormous prices for it. The "Encyclopœdia Britannica" says it is the root of a species of *Panax* (*P. Ginseng*). The demand for it is so great that many other roots are substituted for it, notably *Panax quinquefolium*, distinguished as American Ginseng, imported from the United States. The ginseng prepared in Corea is the most esteemed variety. Lockhart says that all the ginseng collected in China is imperial property, and is sold to those who have the privilege of dealing in it at its weight in gold.

Ginseng of good quality generally occurs in hard, rather brittle, translucent pieces, about the size of the little finger, and varying in length from 2 to 4 in. In price it varies from 6 or 12 dollars to the enormous sum of 300 or 400 dollars an ounce—that is to say, from 24s. or 48s. to £60 or £80 per ounce. [Presumably the prepared article.—Ed. *Q.A.J.*]

Now, we ask how it comes about that a root which is as easy to grow as yams or cassava or ginger is not grown universally in tropical or semi-tropical countries? In Manchuria it grows wild, so it does in Corea, and it is also cultivated in those countries.

Here is what a farmer of New Mexico (U.S.A.) writes about the plant and its cultivation to the "Florida Agriculturist":—The increasing scarcity of ginseng, together with the high prices paid for it, drew my attention to its cultivation for the market. There is no question but that the plant can be as easily grown as any other cultivated plant, provided it is furnished with the right kind of soil and with shade. It was my plan to follow Nature as near as possible, and consequently I began planting the roots and seeds in the rich fertile soil of the forests where there was plenty of natural shade. But, with the experience I now have, I think garden culture with artificial shade or lattice shade is the best. Yet one can grow it successfully in the forest. Lattice shade is more manageable and economical of space. In the forests the plants are checked in their growth by the trees absorbing the moisture, while under the lattice work they have a more thrifty appearance. Open field or garden soil, suitable for growing garden vegetables, is preferable. Old worn-out land can be made profitable by planting it in ginseng if made rich by the use of fertiliser.

I consider ginseng the most profitable crop grown, as but little land is required, and, if properly cared for, will yield a greater profit than many large farms. It requires no great amount of money invested in lands, no expense in building large barns to store your grain, and no expense for stock or help. In fact, it is one of the best occupations one can get into. If our farmers would investigate such a valuable industry as ginseng and grow more of it, in a few years they will find themselves prospering. The demand far exceeds the supply, and it will be many years before the supply of cultivated ginseng will change the price of the root. There is ready sale for it at all times, and it is a sure crop, standing drought better than any other plant.

What ginseng wants most is soil rich in vegetable matter, moisture, and shade. It is of such a nature that it propagates itself by means of its seed only. When seed are planted they produce roots; when roots are planted they produce seed. The bud at the top of the root makes the next year's plant and seed crop. The root sends up each year a new stem, leaving at the top leaves, flowers, and berries. The berries are the seed. Ginseng increases very fast. Plants two years old produce seed. At the first seed crop each plant produces about ten seed, the second about twenty, and the third about forty, and so on, doubling itself every year. Ginseng should be seven or eight years old before digging, as the root continues to grow all the time, and the larger the roots the more valuable they are. Plant a bed every year, and in a few years you can have a bed to dig for market each year. Well-dried ginseng root is worth now from 4·25 dollars to 5·75 dollars (18s. to £1 15s.) per lb., and the cultivated root is worth still more, and is more even in size, of a nicer shape, and better in every way than the wild root. My lowest estimate on 1 acre planted in ginseng, and allowed to grow for five years, at the price it is sold at to-day, is 35,000 dollars (£7,000) for roots alone, and the seed crop on 1 acre for five years would be great. You can always find a market for your seed. There are but few ginseng farms in the United States at the present time, but in my opinion in the next ten years there will be a great number.

[The only wonder to our mind is that there are not already hundreds of ginseng farms in the United States. Five ½ acres should satisfy any reasonable man's desires.—Ed. *Q.A.J.*]

MARKET GARDENING.

TRAINING TOMATOES TO ONE STEM.

As soon as the young tomatoes are planted out, drive in stakes alongside them, to stand 5 ft. above the surface. As the plants grow, pinch off *all* side shoots as they appear, allowing only the *leading* shoot to grow. As the plants increase in height, tie them closely to the stakes, but in such a manner that the ties cannot cut into the stems (raffia fibre is the best).

After a good few bunches have formed along the stem, pinch off the tops of the plants, say, after they are 4 or 5 ft. in height. The plants will then make efforts to send out more side shoots, but keep on removing them as long as any appear. Plants may be allowed to grow with two stems, which is a good plan, but not so easy to manage as the single stem. The object of removing the lateral shoots is to secure larger fruit, and heavier and earlier crops. The side shoots absorb nourishment needed by the fruit, and are of no use to the plant. Wherever tomatoes are grown on a large scale, the single stem plan is adopted, especially in America, where over 8 tons of tomatoes are produced on one acre.

A WAY TO UTILISE OLD NEWSPAPERS.

The "Scientific American" states that an accumulation of old newspapers may be converted into an excellent fuel for use in stove, fireplace, or furnace. The papers should be piled into a tub or other water-holding receptacle until it is about one-third full, and the tub then filled to the brim with water. Left thus for two or three days, the papers will become thoroughly soaked. If at first they show an inclination to float, a heavy stone laid on top will weigh them down until the water completely covers them. When thoroughly soaked with water, the papers are taken from the water and squeezed into balls about the size of one's two fists, and thrown on to the ground in the sun to dry. The papers have become so soft and pulpy that a perfectly compact ball is easily formed. It will dry, if left in the sun long enough, until it is almost as hard as wood. These balls, if made in the summer, will constitute excellent fuel for winter use, and will burn in the fireplace with a glow like carbon briquettes. Moreover, they will burn with comparatively little ash, and they are clean to handle.

Pastoral.

THE PRICKLY-PEAR FEEDING STATION, WALLUMBILLA.

SECOND PROGRESS REPORT.

The work of this Station has proceeded upon lines indicated in a First Progress Report, dated 20th June.

The utility of prickly-pear in the maintenance of cattle will be here briefly reported on, together with such facts becoming evident during experimentation as are deemed worthy of notice.

THE COMPARATIVE MERITS OF SCRUB AND FOREST PEAR.

A series of comparative analyses of scrub and forest pear, made through the period, May to August, shows no essential difference in composition. In either "variety," entering upon the period in question after sufficient rains, seasonal variation has been inconsequential, except that with the spring season a slight increase in percentage of protein is apparent. Comparison of palatability shows no superiority for scrub pear, and absence of any temporary augmentation of appetite on change from one variety to the other is evidence of no distinction in flavour. The apparent preference of browsing animals for the scrub "variety" will probably be found due to a comparative innocuity of prickle, upon which question it is being endeavoured to obtain demonstrable evidence. The non-occurrence of fruiting season has rendered the investigation of higher palatability of the popular "male" or "cow" pear impossible of approach or co-relation of abnormality in fruiting with properties rendering it more highly acceptable to the animal. It is significant, however, that the scrub pear utilised for comparison of palatability with the forest "variety" showed evidence of having been much eaten down by grazing cattle during the recent drought, and the cuttings were made very largely from plants selected by animals having access to the area.

The whole question of the existence of a pear of superior nutritive value or palatability is one of great importance in the ultimate evaluation of the grazing value of pear, and should be subject to inquiry as far as means permit.

ON MAINTENANCE FEEDING AND THE USE OF SUPPLEMENTARY FEEDS.

The main issues of experimental work in the maintenance of mature animals are the following:—

1. Prickly-pear does not suffice for sustenance, though it would appear that a ration solely so constituted might preserve life for a considerable period, the duration depending on initial condition.

2. Prickly-pear with medium amount of non-nitrogenous roughage is much more efficient, and would suffice to preserve cattle for long periods though with ultimate considerable depreciation.

3. Prickly-pear, supplemented by nitrogenous concentrates or leguminous hay in comparatively small quantity, conserves body-weight and excellent condition, and in the amounts consumed permit of actual though small gains. The incidence of the experimental period at the time of year of lowest diurnal temperatures warrants the conclusion that during milder seasons the observed gains would be somewhat augmented.

4. The satisfactory result recorded in 3 can be achieved at a cost per head of little more than 2d. per day.

5. The amount of pear eaten per day is primarily dependent on the individual appetite for pear.

6. When pear is the sole diet, the amount consumed is much below that which the animal is willing to take when supplementary foods are judiciously employed.

7. In minimum amounts nitrogenous supplemtary feeds are conducive to higher pear consumption than non-nitrogenous.

8. Satisfaction of appetite by employment of more than a minimum quantity of supplementary feeds leads to diminished pear consumption.

THE TREATMENT OF PEAR FOR HAND-FED STOCK.

Indubitably the method to be adopted for rendering pear acceptable to farm cattle should involve the minimum of time and labour. Experience gained by allowing experimental animals access to pear on forest has demonstrated that selection is made of certain terminal cladodes almost devoid of prickle or invested with prickles of pronounced downy character, both of which are limited in quantity. It became evident, both from inspection and rapid decline of body-weight below normal, that grazing was impeded.

The passage through a form of slicer—as has been the practice on the Station since the inception of feeding—provides an alternative to the removal of prickles from standing pear by singeing either by gasolene torches or other means. It is the opinion of the writer that harvesting, hauling, and slicing will prove as little tedious and as rapid as any method of singeing that is likely to be devised. It should be possible for one man to provide by this means and to distribute pear for fifty to sixty head per day at the maximum average rate of consumption ascertained, while improvement in the means of feeding the slicer in operation should enable a somewhat greater quantity to be dealt with. Pear in this form has been readily eaten, and the prickles, detached or softened by exudation from the cut surfaces, exert no injury on the tongue or palate. No animal in five months during which chopped pear has been daily administered has given any evidence of discomfort from this cause.

Whether veterinary inspection at this or a later stage is desirable is left to the discretion of the Advisory Board. Scouring, resultant on pear consumption, has not been pronounced or excessive except on occasions in animals receiving pear alone or in individuals obtaining, with minimum amounts of supplementary fodders, upwards of 90 pounds of pear per diem.

THE IMPROVEMENT OF PALATABILITY OF PEAR.

The utility of pear in rations is proportional to the amount consumed. With the view to increasing daily consumption, some attention has been paid to possible improvement of palatability and to inquiry into the influence of method and frequency of feeding on appetite. Such means as have been adopted—notably, salting of ration, incorporation of oilcake, and more frequent administration of smaller quantity—have failed to augment the amounts partaken of. Experimentation with a limited number of animals and cooked pear is in progress.

THE PROJECTED COURSE OF EXPERIMENTATION.

It was purposed at the conclusion of the maintenance trials to investigate the function of pear in rations designed for fattening. These involved the employment, respectively, of concentrates up to 7 lb. per head per day and of leguminous hay up to 8 lb., and were calculated, in the additional quantities above the maintenance allowance and with a sustained pear consumption, to produce up to 2 lb. liveweight increase per day. The operation of increased supplementary feeds, as noticed in paragraph 8 (above), has made it evident, however, that the rate of fattening increase designed would be much reduced, and that a limit is set to the productive value of pear rations.

The writer prefers to allow any further pronouncement upon this phase of the subject to remain in abeyance, except to point out its significance to the whole question of productive pear-feeding. A more accurate study of the influence of quantity of adjunct feeds upon pear appetite is warranted, with a view to ascertaining the maximum nutriment that can be administered in pear-concentrate or pear-hay combinations, while preserving a considerable proportion of pear. Meanwhile, a determination of maintenance requirement on rations, consisting solely of pear and nitrogenous supplementary foods, has been instituted partly for the purpose of investigating the effect of pear and concentrates fed without usual roughage feeds, which were utilised in small amount in the first maintenance work and to adjust the maintenance allowance to the requirements of a period more in agreement with the mean annual daily temperature.

On this basis it will be possible with close approximation to evaluate the productive capacity of any pear ration subsequently elaborated.

While scientifically sound, this method of attack possesses an advantage of being less expensive in its application than the feeding of rations containing considerable amounts of concentrated feeds over a comparatively lengthy period.

In view of the almost universally held belief that access to water is inimical, it has been resolved to direct inquiry to this point during late spring and early summer.

Any detrimental effect should be made manifest by comparison of the efficiency of an allotted maintenance ration in watered and unwatered animals. The writer professes the belief that the somewhat limited water supply of the medium pear-eater on succulent pear may at all times not be below the physiological minimum for store or fattening cattle, though water supply may become a crucial question to cows in milk.

Attention is also being paid to the analytical examination of edible shrubs, and for this purpose specimens are at present being collected.

Accordingly, the work of the Station is proceeding on the following lines:—

(1) Determination of spring and summer maintenance requirement.

(2) Investigation of the comparative progress of watered and unwatered animals on pear diet.

(3) Determination of pear rations of maximum nutritive value and pear content.

(4) Attention to the question of variation in prickle as a determining factor in edibility to browsing animals.

(5) The analyses and evaluation of edible shrubs.

CULTURAL OPERATIONS.

Subsequent to the date of the First Progress Report there have been harvested one-third of a ton of field peas and wheat and barley, sufficient at an estimate for 5½ tons of hay and 6 tons of silage. The stacked hay has been efficiently thatched for storage till next year, and the ensilage stock raised to 30 tons. Complete filling of the silo was hindered by a breakdown in the engine operating the cutter. Full stock of silage can be secured from an ensuing cut of wheat, of which 5 acres were drilled in late July.

Two acres are at present occupied by field peas.

An oat crop of small area failed to come on, and will be found unsuitable for utilisation as feed. It is proposed to immediately sow the ground available with cowpea.

" FRANK SMITH.

The Prickly-pear Feeding Station,
Wallumbilla, 22nd September, 1916.

The Orchard.

WOOL YOLK FOR CODLIN MOTH.

Some little time ago there appeared a paragraph pointing out how an apple grower had for seven years secured complete immunity from the codlin moth. His plan was to scoop away the earth from the roots of the trees at the fall of the year and fill in the depression with sheep droppings. The result was that his trees were not afterwards affected by the codlin moth, besides which the crop of fruit was unusually heavy. What was the reason that the codlin moth had made itself scarce? The man himself advanced the theory that in the manure there would be a percentage of wool yolk, and that this soaking into the trees became objectionable to the larvæ of the pest. Not a few scouted the idea as absurd, but there now comes some support to the theory by another orchardist, who says that he always ran his sheep in the orchard, as by rubbing themselves against the trunks of the apple trees they embalmed the bark with a certain amount of yolk, and since he has been doing this he has not seen any riddled fruit from the ravages of the moth. It ought to be a very easy matter for the Department of Agriculture to investigate this matter. Hitherto the uses of the yolk have been passed by in Australia, but not so in other countries. We seem to sell the greasy wool as if we were glad to get rid of a by-product, the value of which used to specially appeal to the Germans. Catch the Hun buying scoured wool. He gladly paid the freight on the grease.—"New Zealand Farmer."

THE BANANA BEETLE AT COOROY.

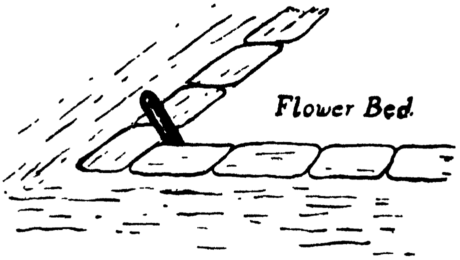
A meeting attended by about fifty banana growers was held last month at Cooroy, to discuss the banana beetle which has been discovered in that district.

The facts showed that last year, when large consignments of plants were landed in Cooroy, there was one of 4,000 plants from Redland Bay, and it was these that were affected. Mr. Mitchell (Government inspector) had visited the district, and had traced one lot from the original 4,000, and the beetle had been found, and he had immediately declared the district affected, and advised immediate action to get the menace eradicated. There are now some 500 or more acres of land under bananas, and the growers are fully alive to the responsibility of drastic action. It was decided, on the motion of Mr. Hugh Walker, who is one of the largest growers, to immediately correspond with the department, and endeavour to obtain the services of an inspector to make a minute inspection of every plantation in the district, and also to ask that Mr. Tryon (Government Entomologist) visit the district and address the growers on the habits of the beetle and the means of eradication. It was also decided to form a fruitgrowers' union, so that united efforts could be taken. At present only two plantations are known to have the beetle, and it is expected to have the pest fully eradicated in a short time.

Horticulture.

A USEFUL HINT TO GARDENERS.

In gardens where the beds are laid out in square diamonds, and triangles, it is troublesome to water them with a long hose, as in turned corners of the pathways, dragging the hose along, as it is sure to cut off corners instead of following along the path. The result is that the gardener has to make frequent stops and go back to prevent the hose from sliding over and destroying, perhaps, valuable plants, by lifting it back to the path. We early discovered this, and as a preventive, drove in iron rods at the angles of the bed, thus keeping the hose off the plants. We were not so fortunate as a flower gardener in South Africa, who struck the same idea and was awarded a one-guinea prize in the monthly competition instituted by the proprietors of "South African Gardening and Home Life," Johannesburg. This gentleman's plan is here depicted, and he remarks that to obviate the trouble, he bought a few ordinary broomsticks—one being needed for every four corners of flower-bed to be protected.



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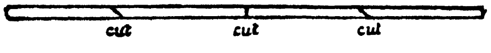


Each stick is sawn into four pieces, and a piece is then hammered into the ground right at the corner of the bed to be protected, leaving some 3 to 4 in. of stick above the ground. It is advisable to knock the wood in so that it slopes outwards towards the path, as sketch No. 1, so as to prevent the hose "riding" over the peg if it is dragged against it. It is also as well to make two of the saw cuts, when sawing the stick into four, in a *diagonal* direction, as per sketch 2, as this then leaves each of the four pegs with one end pointed, which makes it all the easier to hammer into the ground. Since adding these corner ornaments, it has been possible to pull a fairly lengthy hose round the paths, without the bother of going back and lifting each length piece by piece, and also without any damage to the flower beds. The writer is aware that the best authorities recommend *not* dragging the hose along gravel paths, but he is certain that those authorities do not live in a little dorpje which enjoys about half an hour of water a day in the summer time, so that the watering of a garden of any size becomes more of a cycle race than a leisurely saunter round.

For the better preservation of the pegs, they should have a coat of paint before putting into the ground, and green is a very suitable colour.

Incidentally, the snake-like winding of the hose as it progresses along paths and winds round pegs, helps considerably to retain a kitten and a baby in good temper, and assist to keep those charming " garden ornaments" in their right place, off the flower beds.

THE DIVINING ROD.

Mr. W. A. Deane, district surveyor at Grafton, New South Wales, in an article published in the "Surveyor," gives some interesting particulars of his experience with the use of the divining-rod in locating subterranean water.

" It is not generally known," he writes, " that the depth of a stream can be approximately ascertained. I do not say that it can always be accurately determined without fail, because I have not seen it proved yet a sufficient number of times, but I have proved that it can be found by the following method:—Having located the stream and found its general direction, stand on the edge and walk at right angles to it, holding the rod; it will fall at one particular place, and the distance from that place back to the edge of the stream is the depth at which the water will be found. It is the radius of a circle, of which the observer above the edge of the stream, on the earth's surface, is the centre. It can easily be ascertained if the rod was falling on account of another stream by walking further on and going back towards the located stream; if it fell for the depth, it will not fall when going back till the stream is reached. Further mystery. Mr. F. J. White, of Saumarez, Armidale, told me of this some years ago, and I have tested it from bridges over rivers, where the heights could be actually measured, also by the depths of wells sunk down to underground streams. Though I can locate an underground stream, I have not yet come across any means of telling the volume of water in the stream. The subject is an important one, especially in such a country as this, where so much of the water is underground, and I think it should be widely known that there are two ways of holding the rod. I have come across people who said they had tried, and the rod would not work for them; and I found they had been holding the rod with their hands apart, and they were surprised when they found that, on joining their hands, the rod worked for them."

[Mr. Deane mentions that the instrument for finding water may be either a forked stick from any green tree supple enough to bend without breaking, or a loop of wire—either black, galvanised, or copper.]

Viticulture.

WINE-GROWERS' CO-OPERATIVE WINE-CELLAR.—No. 3.

By G. A. GATTINO, Charleville.

Some explanations concerning co-operative cellars—

(*a*) The share of each member in the formation capital.
(*b*) The maintenance of the Cellar.
(*c*) The distribution of profits.

Regarding the share of each member in the formation capital, the following method could be adopted:—

That each member bring to the Cellar all wine vessels and cellar implements that he owns, in good working order, and these will have to be itemised and valued in a special inventory book.

Should this material require immediate repairs, same will be made at the expense of the proprietor, deducting the amount from the value of the produce supplied in one or two years' instalments in proportion to the amount expended.

For new machines which may be required and vessels to contain the wine of members not possessing any, the Cellar will buy them and deduct the cost from the produce of all the members in proportion to their deliveries.

By doing so the constitution of the Cellar will become easily formed, because the one who brings vessels and implements will be compensated by the interest that the Cellar will pay him on the value of them, and the one who has none (which is often the case of the small proprietors) can also become a member of the Cellar, because the latter will buy what is required and make a small charge on all the members.

Should winding-up become necessary, the proceeds of plant purchased by the Cellar will be divided amongst all members.

Regarding the building of the Cellar, this will have to be properly built, with economy and in accordance with the requirements of modern enology.

By this method it is not easy to have straight away sufficient means for this purpose; therefore, in the first few years, it could be arranged to rent premises conveniently situated.

The rent would be contributed to by all the members in proportion to the quantity of produce delivered by each.

Meanwhile by the annual instalments retained by the Cellar, a fund would accumulate for building purposes, never forgetting that this building must be of plain design and properly adapted for a Cellar for that particular district.

Speaking of the maintenance of the Cellar, a question arises as to the quantity of grapes that each member should bring to the Cellar. In some Cellars members would be called upon to consign all the grapes they produce; in others a minimum limit would be fixed; in both cases the grapes of bad quality would be rejected as the Director may decide.

For all expenses required in the maintenance of the Cellar, the same rule will be applied of proportionate share, calculated on the *quantity* of produce brought to the Cellar by each individual member.

Above all difficulties, however, the most important is undoubtedly the one referring to the distribution of profits.

As I before stated, the profits have to be absolutely distributed on the basis of *value* of the material delivered, because it is only natural that the possessor of inferior quality grapes cannot pretend that they should be valuated on the same basis as for good, sound grapes.

It is therefore necessary that a graduated scale be established between different grapes.

This can be done by reckoning the different elements that influence the value of the special produce.

The system of the degree of density can be adopted, or, more rational still, the glucometric degree.

These coefficients, varying by season and locality, could conveniently be modified and ascertained, adapting same to the different varieties of plants.

On the same fixed basis establishing the proportionate right of each member to the distribution of net profits, the advances that could be paid or the warrants to issue to each member can also be calculated, limited, however, to the rules and regulations of the co-operative.

In conclusion, this matter absolutely will represent the pure and true co-operative principle amongst growers, preventing any chance of any shareholder gaining fictitious supremacy above others or deriving a profit without supplying the material means to make same.

It would therefore prevent a capitalist speculator becoming a member without being a grower and supplier, and the distribution of the profits would be equitable and the vote would be also proportionate to the delivery of supplies.

In Europe there are many of these co-operative Cellars very successful; their number is increasing every year. The Governments are encouraging these institutions by way of subsidies.

If the Government of this country would assist the establishing of such cellars by formation subsidy it is certain that a large and permanent new industry would be established, increasing the area of land under grape cultivation, and also benefit the State generally and the public and temperance in particular.

Tropical Industries.

COTTON MEMS. WORTH NOTING.

On 15th September a Texas farmer sold a bale of cotton at 15 cents. (7½d.) per lb. The bale weighed 677 lb., and brought 101.55 dollars (£20 6s. 5½d.). The seed from the cotton in the bale weighed 1,202 lb., and was sold at 45 dollars (£9) per ton, making a total of 128.60 dollars (£25 15s.) received for the one bale of short-staple Uplands cotton, similar to the Uplands cotton variety being supplied to Queensland farmers by the Department of Agriculture and Stock. Again, in Texas, in the same month, a negro tenant farmer gathered 100 bales of cotton from 175 acres of land. A bale of cotton is a bale of 500 lb. of ginned cotton. The current season's output of American cotton is estimated by the United States Department of Agriculture at about 11,800,000 bales. The Continental and Commercial National Bank of Chicago estimates the yield at 10,600,000 bales, or 1,200,000 bales less than the estimate of the Department of Agriculture. Latest telegraphic advices from London towards the end of October quoted 10½d. per lb. (21 cents) for Uplands cotton. The extent to which the ravages of the boll weevil in the United States have damaged the cotton crop is shown as follows in "The Cotton and Cotton Oil News," Texas, of 18th September:—

"The Census Bŭreau of Entomology published an amazing report on the spread of the boll weevil. During 1915, 86,800 additional square miles of cotton area were infested, against an average yearly invasion of only 17,048 square miles. At present, of the total cotton belt area of 609,000 square miles, only 200,000 are free of infestation."

This terrible pest does not exist in Queensland, and strict regulations regarding imported cotton seed from America safeguard us from its introduction.

We advise Queensland farmers to largely grow cotton now, and during and after the war. Everything points to high prices.

CASSAVA AS A COMPETITOR OF MAIZE AND POTATOES IN THE PRODUCTION OF STARCH AND ALLIED PRODUCTS.

New industries are very slowly entered upon in this State, and that for several reasons. At the head of the older industries stands the cultivation of sugar-cane, and the manufacture of sugar, to which crop some 160,000 acres are devoted on the coast lands from the Southern border to Port Douglas, a stretch of over 900 miles. From this area, about 225,000 tons of sugar are annually produced on some 4,000 plantations. Sugarmills number fifty-two, and the capital invested in sugar machinery amounts to nearly £3,000,000. Exclusive of hands employed in the fields planting, cultivating, cutting, carting, irrigating, &c., numbering about 5,000, some 5,000 hands are employed in the works, and many thousands more derive a good living indirectly from the industry, amongst whom are to be reckoned carters, wharf labourers, seamen, shipowners, mechanical engineers, storekeepers, and many others. The check given to the sugar industry this year has had a disastrous effect upon all engaged in it. The mills, except in a few instances, closed down, and thousands of acres of cane ready for the mill were left uncut, whilst cane already cut lay rotting in the fields. The money value of the sugar which should have been produced weekly from 72,500 tons passing through the rollers is set down at £144,000. The causes which led to this disaster we cannot discuss. What we are concerned about is, to point out how cane lands could be utilised by growing some other crop which, while not requiring so much labour as the cultivation and manufacture of sugar, would keep the land under a crop suitable to the tropical and sub-tropical climates. Such a crop appears to be cassava, which has been proved to be a formidable competitor of maize in the production of starch and allied products.

Maize starch has its own characteristics which distinguish it from other starches. In the plant cassava we have a raw material which yields a starch of the highest purity, possessing all the characteristics of the maize product, the cost of production being one-fifth that of maize. Of the cassava there are two varieties—the sweet and the bitter.

In the tropical regions of South America and in the West Indies cassava forms a valuable article of diet under the name of manioc or manihot, in the shape of cassava flour and the well-known tapioca of commerce. The plant is a semi-wooden shrub, and attains a height of from 5 to 6 ft., and under favourable conditions of soil and climate, even as much as 8 ft. The leaves have somewhat the appearance of papaw leaves. The value of the plant lies in its large tubers, which attain a weight on an average of 8 or 10 lb., with a length of 18 in. to 2 ft. These tubers are brown, or dark yellow, and contain a quantity of poisonous juice. Fortunately, the poison is very volatile—consisting of hydrochloric (prussic) acid. In the bitter variety the poison is distributed throughout the root, while, in the sweet cassava, the poisonous principle is chiefly in the rind. The bitter cassava can be distinguished from the sweet by the leaves. In the former the leaves have seven divisions; in the latter, only five. The root also of the sweet variety is smaller and reddish in colour, and does not contain so much farina as the bitter, hence the latter is almost exclusively cultivated in countries where cassava flour is a principal article of native diet.

The average percentage of starch is from 25 to 26 with fresh roots, and the product obtained in Florida, U.S.A., from several pounds of roots had all the characteristics of the best maize starch, and 4 per cent. of sugar was recovered from the liquor.

In the Annual Report of the Department of Agriculture, Mauritius, for 1915, it is stated that amongst the manioc (cassava) variety tests, the White Top, bitter, yielded 4,770 lb. of starch per arpent (⅚ of an acre).

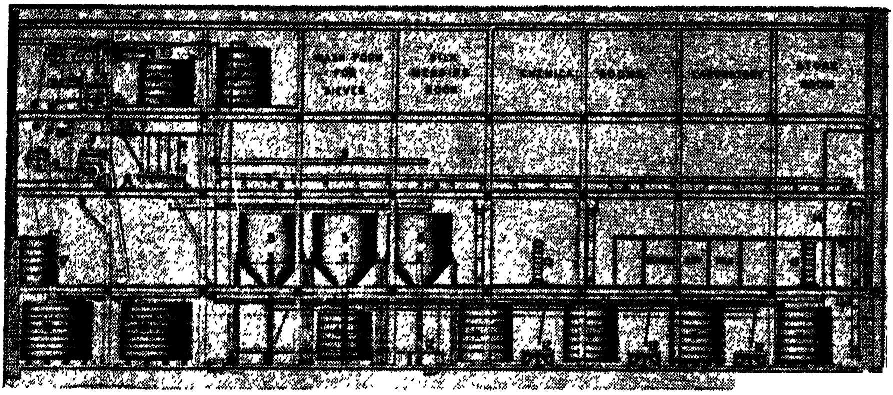
Compared with maize and potatoes, upon which practically the whole world depends for its supply of starch, the average yield of starch is as follows:—Maize, 53; potatoes, 18; cassava, 25 per cent. An acre of ground yields an average of 40 bushels of maize, which, in turn, yield 1,200 lb. of starch, whilst the same ground will yield 10 tons of cassava yielding 6,720 lb. of glucose and 5,000 lb. of starch, and it is possible to reach a much greater amount. In Jamaica, 20 tons per acre are easily produced, and judging by what we have seen of the returns of cassava in Queensland, our rich scrub lands, such as most of our sugar lands, should yield as much as the Jamaican sugar lands. (See Plate 35.)

Plate 35.—Field of Cassava at Farnbro, Childers.

It is quite evident that cassava is the cheapest known source of starch.

The only complete cassava starch factory in the world is situated at Lake Mary, Florida, where cassava, grown on a basis of 8 or 10 tons per acre, costs ¼d. per lb. in the unmanufactured state, or £2 6s. 8d. per ton. It may here be mentioned that arrowroot bulbs, some years ago, were grown by the writer at Oxley Creek, near Brisbane, and sold at £2 10s. per ton to Messrs. Grimes, who had an arrowroot mill on the Brisbane River, and this price paid the grower handsomely. A cassava starch plant was devised by Professor Arnold, Ph. D., Toronto (Canada) University, in, we believe, 1902, by means of which the whole 25 per cent. of dry starch can be obtained, and this plant can be worked 25 per cent.

cheaper than the potato starch plant, the process being automatic and continuous. The plant will work up 100 tons of roots per day of ten hours. The entire process only occupies three days, when the starch is ready for market, while maize, under the most favourable circumstances, requires from twelve to fourteen days. The machinery is very simple and not at all costly. (See diagram.)

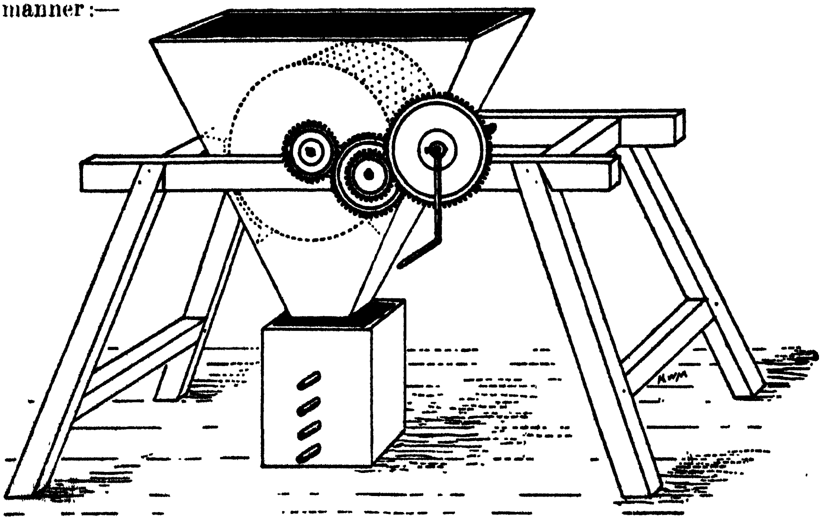


LONGITUDINAL SECTIONAL ELEVATION OF STARCH PLANT.

EXPLANATORY KEY.

1. Degerminator.
2. First Grinder.
3. Shakers.
4. Sprinklers over Shakers.
5. Cones.
6. Well, after Cones.
7. Regulator Tanks to 8.
8. Starch Tables.
9. Starch Conveyors.
10. Break Tanks.
11. Washing Tanks.
12. Boxing Tables.
13. Cars for the Drying Kilns and Packing Rooms.
14. Pumps, &c., to convey Starch to Glucose House.
15. Corn Screen.
16. Magnetic Separator.
17. Hot Water Tank to Supply Steep Tanks.
18. Steep Tanks.

The cassava farina constitutes the tapioca of commerce when heated on hot plates, which causes the grains to swell, many of them bursting, and the whole agglomerating into irregular masses or lumps. The finest are sold as tapioca, the intermediate sample being used as starch. There are large plants for making tapioca. Pearl tapioca is made in the following manner:—



The dried masses of starch are placed in a hand mill, where they are reduced to the size of No. 4 shot. From the roof of the factory hangs a coarse cloth, like a veranda blind, spread out by a wooden cross-piece, so that it looks like a canvas boat. The cloth is filled with the shot-like starch, and it is then swung backwards and forwards by two men. Under this treatment the grains are ground into perfectly round little balls, which require to be once more warmed for half an hour by gentle heat in a pan, when the process is complete.

CULTIVATION.

The planting and cultivation of the cassava plant are as simple as for arrowroot. It should, for preference, be grown near the coast, where atmospheric moisture is found even in the absence of rain, which is only required during the first two months after planting. After that, the plant will thrive without any further showers.

As a matter of fact, the plant will thrive under the most diverse conditions of climate (frost excepted), on dry plains, on rocky hillsides, as well as on humid plains and hills, wherever the soil is friable or gravelly.

We have seen very large tubers grown near Barcaldine, 358 miles inland from Rockhampton, in Central Western Queensland.

THE MANUFACTURE

of the starch is similar to the process adopted for the manufacture of arrowroot in Queensland (peeling excepted). The tubers are washed and peeled to get rid of the poisonous principle. They then pass through a grating machine, continuous streams of water being poured on the mass to separate the starch from the fibre. When the starch has settled in the vats, the water is drained off through a series of taps. More water is added and the starch is well stirrred, and again allowed to settle. This process is repeated until the starch is perfectly white. After this, it is cut out in lumps, thoroughly dried on airy shelves; and then placed on heated tin plates.

BY-PRODUCTS.

The fibrous and glutinous matter left in the filter presses is dried and sold as cattle fodder. Glucose is also made from the pulp. The starch in the boxes is made into tapioca.

Botany.

NOTES BY THE GOVERNMENT BOTANIST.—No. 3.

THE SWORD BEAN (*CANAVALIA GLADIATA*) AND THE JACK BEAN (*CANAVALIA ENSIFORMIS*).

Information is continually being sought for in regard to these two plants, which have been cultivated in Queensland for some time, the Sword Bean more commonly than the Jack Bean. The following information is compiled from various sources, mainly from an article by C. V. Piper in Circular No. 110 of the Bureau of Plant Industry of the United States Department of Agriculture:—

SWORD BEAN (*Canavalia gladiata*).

All varieties known to me are climbers. The leaves are composed of three large leaflets. Flowers varying in colour, rather large. Pod 10-14 seeded, the valves becoming hard and somewhat woody when ripe. Seeds red or white with a large brown hilum almost the length of the seed. In India the variety with white seeds and white flowers is most esteemed.

The Sword Bean is found cultivated through much of Asia and Africa, and has been introduced into America and Australia, but only grown in these latter places in a limited degree. In Queensland during the past few years it has been sold by the seedsmen under the name of "Bengal Butter Bean." It is commonly cultivated as a vegetable in Japan, India, Burma, Java, and the Mauritius. The young pods are prepared after the manner of French Beans, and are said to be well flavoured and wholesome; when older, the pods are very tough and stringy. P. Boname, writing on the bean as grown in Mauritius, highly recommends the green pods as a vegetable. The seeds seem to be used as food to only a limited extent. In Queensland, reports are somewhat conflicting, some persons speaking most highly of it, others complaining of severe ill-effects after eating it.

As a forage plant its value is not very high, the vines being of a rambling habit and the foliage rather bitter. As a cover crop it has proved satisfactory in Porto Rico, and cattle are said to graze there on the plant to a limited extent.

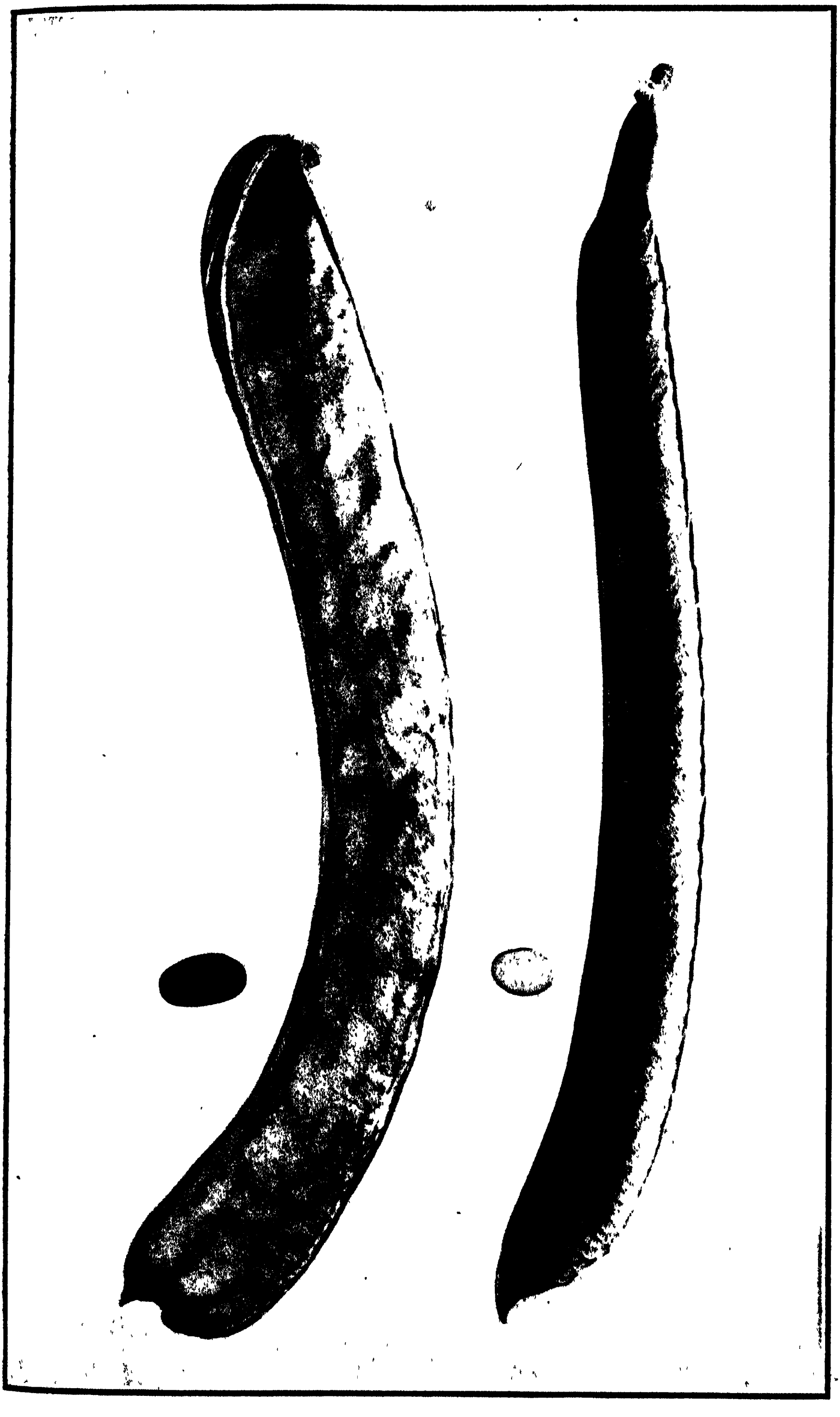


PLATE 36.—SWORD BEAN. JACK BEAN.

JACK BEAN (*Canavalia ensiformis*).

The Jack Bean is a bushy annual plant attaining a height of 4 ft. The rather thickish leaves have a decidedly bitter taste. The flowers are usually purple. The first blossoms are born near the base of the stem, so that many of the pods hang low. When mature, the pods are hard and firm, 9-14 in. long, each containing 10-14 seeds, which are pure white. The plant is said to withstand much drought and to be remarkably free from insect and fungus pests. The Jack Bean is a native of West Indies and the adjacent mainland. In Jamaica it is called the Horse Bean or Overlook Bean; in Antigua it is known as the Babricon Bean; and in the United States as the Pearson Bean, and also the Wonder Bean. Some years ago several experiment stations connected with the United States Department of Agriculture carried out tests with this bean, the yield varying from 30-40 bushels to the acre. Attempts were made to utilise the beans as feed for both beef and dairy cattle, but they were found to be both unpalatable and indigestible. More recent experiments carried out at Hawaii showed that the reason for this was a too limited experience of its use. As with most new feeds, it is important to use at the beginning only a small proportion in the accustomed ration, and then increase the proportion gradually. Several dairies have fed green Jack Beans and sorghum in equal proportions to dairy cows with excellent results. In an article on the Jack Bean in the "Agricultural Gazette of New South Wales" for May of last year, Mr. E. Cheel states that he tried some young pods, varying in length from 4-9 in., cut up into slices and cooked in the same way as French beans. The smaller pods were tender and palatable, but the inner lining of the larger pods proved to be tough and horny. Mr. Cheel found the seeds of the larger pods, when fully developed, useful in the same way as Lima beans or broad beans.

ANONYMOUS COMMUNICATIONS.

We cannot reply to anonymous communications. A letter has reached us from a resident of Deeford, Dawson Valley line, on the subject of vine growing in that district, signed "An Interested Farmer." We will give the information required when we know whom to address. The same applies to "Interested," Fig-tree Pocket, Cairns, who asks that a certain issue of the Journal may be sent to him.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

Milking Returns of Cows for Month of September, 1916.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Bluebelle ...	Jersey	22 June, 1916	905	4·7	50·14	
Nina ...	Shorthorn	24 June ,,	1,110	3·6	46·84	
Netherhall Queen Kate	Ayrshire	15 June ,,	1,101	3·6	46·46	
Lilia	,, ...	4 Sept. ,,	1,039	3·6	43·85	
Lowla II. ...	Shorth'rn-Ayrshire	6 July ,,	979	3·8	43·61	
Lady Melba	Holstein	28 Oct., 1915	983	3·7	42·61	
Sweet Meadows	Jersey	16 Aug., 1916	686	5·2	42·13	
Thornton Fairetta	,, .	26 May ,,	713	5·0	42·06	
Auntie's Lass	Ayrshire	4 April ,,	814	4·3	41·18	
Rosine ...	,, ...	5 July ,,	876	3·8	39·01	
Miss Bell ..	Jersey	1 Aug. ,,	597	5·4	38·10	
Iron Plate ...	,, ...	20 Jan. ,,	596	5·4	38·04	
Princess Kate	Ayrshire . .	21 June ,,	826	3·9	37·80	
Hedge's Dutchmaid	Holstein .. :	22 Aug. ,,	980	3·3	37·77	
Pauline ...	Shorthorn.. ..	16 Aug. ,,	913	3·5	37·39	
Mistress Bee	Jersey .	21 Jan. ,,	570	5·2	35·02	
Lady's Maid	Shorthorn .	26 Jan. ,,	665	4·2	32·82	
Belinda ...	Ayrshire .	27 Feb., ,,	717	3·8	31·94	
Cocoatina .	Jersey . .	17 Mar. ,,	573	4·7	31·74	
Lady Loch II.	Ayrshire .	17 Mar. ,,	728	3·7	31·55	
Skylark ...	,, . .	21 Mar. ,,	728	3·6	30·70	
Twylish's Maid	Jersey	22 Oct., 1915	508	5·1	30·60	
Netherton Belle	Ayrshire .	23 April, 1916	560	4·5	29·68	
Lady Margaret	,, ...	14 Oct., 1915	550	4·5	29·15	
Miss Mischief	,, .. .	15 June, 1916	584	4·2	28·83	
Charity ...	Jersey	28 May ,,	511	4·6	27·69	
Leonie ..	Ayrshire	16 Aug. ,,	653	3·6	27·53	
Lady Spec...	,, ...	6 Jan. ,,	608	3·7	26·35	
Jeannie ...	,, ...	1 Nov., 1915	473	4·5	25·06	
Red Lark ...	,, ...	24 June 1916	508	4·1	24·47	
Constancy ...	,, ...	24 Nov., 1915	547	3·8	24·26	
Lady Mitchell	Holstein .	3 June, 1916	570	3·6	24·05	
Violette's Peer's Girl	Jersey .. .	8 Dec., 1915	337	6·0	23·94	
Windyhill Davidina	Ayrshire	16 July, 1916	558	3·6	23·53	
Jess of Greystanes	,, ...	18 Oct. 1915	484	3·9	22·14	
Mischief ...	,, ...	27 Sept. ,,	489	3·8	21·98	
Lerida II. ...	,, .	12 June, 1916	460	3·8	20·49	
Lady Lark...	,, ...	24 June ,,	465	3·7	20·15	

Grazed on Soudan grass during first half of month, received a ration of sorghum ensilage, in addition to natural pasture, during second half.

GOATS' MILK CHEESE.

The demand for goats since the war has been greatly on the increase, and this year in particular, owing to many people being obliged to give up keeping a cow on account of having no man to look after it, goats are wanted to provide a substitute. Now, it often happens where several goats are kept that they are all in full milk at about the same time. This is not good management, but it is not easy to prevent it. Under such conditions there is generally more milk supplied than can be consumed in its natural state, and the goat-owner bethinks him of making it into butter or cheese. Goats' milk, however, seldom makes good butter; it is as white as lard, and generally as soft and greasy; but for cheesemaking this milk is well adapted, and on the Continent—especially in France—goats' milk cheese is in great demand, and forms a commercial industry. The most famous of these—of the hard variety—is Roquefort, though it is said to usually contain a certain proportion of cows' milk on account of the scarcity of the other milk.

There is a very popular belief that Gruyère is composed more or less of goats' milk. The origin of this is difficult to understand, as this milk has never entered into the composition of Gruyère cheese. It may, perhaps, be on account of a breed of goat in France that is known as the Gruyère goat. Most of the cheeses sold in France that are made from goats' milk are of the " soft " variety, and quite small. The best known of these are the Mont d'Or, Levroux, and St. Marcelin.

The following is an American recipe for making cheese of this character, which is said to be of very good quality:—

" Heat the fresh milk to about 90 degrees, and add one teaspoonful of extract of rennet to each quart of milk, stirring it well for three to five minutes; the rennet, however, should first be diluted by twenty times its equal of cold water. Set the milk aside and leave until thoroughly coagulated. Let it stand for twelve hours, when it should be cut into small cubes with curd knives, or sliced at right angles with an ordinary knife, and stirred with the hand for ten or fifteen minutes, after which it should be strained through a cheese-cloth and the curd packed in perforated tin moulds placed on straw matting. The perforated cups used in small fruit presses are very good for the purpose if lined with cheese-cloth. The moulds should be turned every half-hour for several hours until all free whey has drained off and the cheese is firm; slight pressure will be helpful. When firm, the cheese is removed from the cloth and sprinkled freely with salt over the upper surface. After twelve hours turn the cheese and salt the other surface and edges. These cheeses should then be ripened for about three weeks in a cool cellar (temperature about 60 degrees), when they become mellow in texture, with a flavour resembling Schweitzer. Four quarts of milk will make two cheeses 3½ in. in diameter and about 2 in. thick, weighing about 10 oz. each."

It may be of interest to mention that the milk from the goats exhibited at the Royal Show at Manchester last week was made into cheese, being the first attempt of the kind at any show in England.

This is an educational feature of a very useful kind, and one that attracted a good number of goatkeepers, of which there are many in that neighbourhood, for a question that the writer is repeatedly being asked is: "How can I make cheese with my surplus goats' milk?"—"Live Stock Journal."

PROFITABLE CARE OF DAIRY COWS.

A New Zealand journal writes: "This is how a Canterbury dairyman, who keeps 38 cows on 32 acres, feeds them. The cows are feeding, on the whole, seven hours a day in the stalls. The rest of the time they are on the pasture, each cow rugged on cold days. This dairyman never buys any feed; he grows it all on his own small farm. The daily bill of fare is: hay for breakfast, ensilage for dinner, hay and mangels for tea. That's all; but every cow is given all she will eat up clean, and consequently the leisure of the cow is occupied in resting and making milk. She never has to hustle for her tucker. Need we repeat that this is the method of a man who never had any practical experience of the work until he set to work on his present farm. Before that time he was a commercial traveller, and earlier still was an apprentice to an engineering business. Now he makes rather more net profit than two commercial travellers."

THE PREPARATION OF HOME-MADE RENNET.

By A. TODD, Manager, British Dairy Institute, Reading; and ELFRIDA. C. V. CORNISH, M.Sc., Assistant for Chemical Research, Dairy Research Institute, Reading.

(From the "Journal of the Board of Agriculture," London, August, 1916.)

The present price of rennet has led to the carrying out of certain experiments, an account of which will be given in the September issue of this Journal. Rennet, prepared by the method described, has been used in the preparation of cheeses with results which appear to be satisfactory.

Rennet is prepared from the fourth stomach, or vell, of the calf, and has usually been extracted from the vells after they have been dried. At the present time, however, it does not appear to be possible to obtain a supply of dried vells which contain enough rennet to make an extract of sufficient strength for cheesemaking. The cheesemaker is, therefore, advised to make use of fresh vells, or of vells which he himself has recently dried.

It is usual to state that the stomachs must be taken from calves of not more than about ten days old, which have, therefore, been only milk-fed. If such vells are available in sufficient number, the stomach contents should be shaken out, not squeezed, the vells slit up and put whole into brine. If, on the other hand, it is necessary to keep the stomach for any length of time before use, the contents should be shaken out, one end should be tied and the vell filled with salt. The other end should then be tied and the skins should be hung up in a current of air in a cool, dark place until required.

If it is impossible to obtain stomachs of calves of the age which has been stated, an extract may be obtained from the stomachs of calves up to two or three months' old, or perhaps even older. Whether the extract is, as a rule, of the same potency as that obtained from younger vells is not yet known; all that can be said is that such rennet has been prepared and was satisfactory. It is mentioned here as a possible way out, in case of difficulty being encountered in securing stomachs of calves of the right age. Whether this extract owes its coagulating properties to pepsin (the ferment of the adult stomach), or to rennet, appears to be immaterial, since it was shown in this country some years ago that quite good cheeses could be made by using pepsin instead of rennet, and, since the war started, this work has been confirmed in America. If vells of this character are used, they should be slit open, the contents removed, and the inner surface washed with water. They should then be placed in the brine.

Preparation of Brine for Steeping.—The following method of preparing the brine solution is recommended:—To 1 gallon of water, which had been previously boiled and cooled, add 2 lb. of salt and 1 oz. of saltpetre. Boil this solution for half an hour, and allow it to cool before using. This is sufficient for ten vells. If the vells are fresh, they may be put straight into the brine; if, on the other hand, they have been salted, the two ends must be cut off and the salt shaken out before putting them into the brine. An enamel pail, with a lid, has proved very suitable for this purpose. The steep should then be kept in a cool, dark place, and should be well stirred twice daily for a week with a clean, Scotch hand, pressing the vells against the side of the pail.

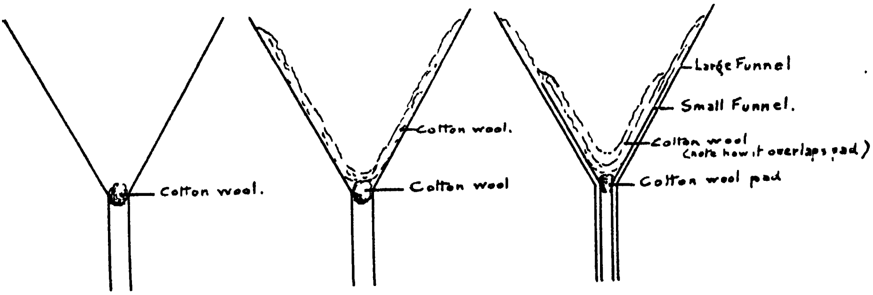
At the end of a week boric acid should be added to the steep in the proportion of 2 oz. to each gallon of brine. If sliminess should develop before seven days, the boric acid may be added at an earlier date. After the addition of boric acid, rennet tests should be made every two or three days until the extract is of sufficient strength to be of practical use. Two points must be borne in mind—(1) that, at its best, home-made rennet is not likely to be of more than half the strength of the commercial article; and (2) that the vells appear to vary considerably in their rennet-producing properties. It is, therefore, advisable to add a considerable number of vells to a larger quantity of brine; for example, 10 vells to a gallon as recommended, as thus the better vells balance the weaker, rather than to add 2 or 3 vells to a quart of brine. When possible, it is well to have more than one batch of vells steeping at the same time.

As a rule it should be found that an extract of sufficient strength is obtained at the end of ten days or a fortnight after the first immersion of the vells in brine. If this is not so, they may be left for another fourteen days, making a month in all, when, if the extract proves still too weak for use, it should be discarded.

If the extract from the first steep proves to be sufficiently strong, say about half the strength of commercial rennet, then the vells may be immersed in a second quantity of brine, ten vells and 1 oz. of boric acid to half a gallon, when quite a usable, though somewhat weaker, extract may be obtained.

Rennet Test.—The simplest means of testing the strength of rennet is the rennet test used by cheesemakers: 1 dr., or 3½ cc., of the extract is placed in a cup; 4 oz. of fresh milk at a temperature of 85 deg. F. is measured. A few pieces of cut straw are placed in a cup to indicate the exact moment that coagulation takes place. The milk is poured on to the rennet in a cup at a given time and stirred with a thermometer for 20 seconds, and occasionally till it has coagulated, thus keeping the straws rotating. When the coagulating point is reached the straws will suddenly stop and give a backward movement. During this period, care must be taken to keep the temperature of the milk at as near 85° F. as possible. This can be done by placing the cup in a basin of water at a temperature of 86° F.

Fresh milk added to the ordinary commercial rennet will coagulate in about 33 seconds, but when added to home-made rennet at least double the time is usually taken.



Filtration of the Extract.—When the vells are ready to be removed from the brine, the whole should be poured on to two layers of cheesecloth fixed over an enamel pail. When most of the liquid has run through, the corners of the cloth are brought together and tied round with a piece of string. The bundle is then suspended over a clean enamel pail, and allowed to drip into it for five or six hours. At the end of this time the bundle is well squeezed by hand, and if considered advisable the vells are placed in a second quantity of brine.

A cotton-wool filter is then prepared by taking a clean funnel, preferably not less than 6 in. in diameter at the top, and placing a piece of absorbent cotton-wool well over the hole in the bottom of the funnel. A long strip should then be placed round the inside of the funnel, with the lower edges coming well down and over the edges of the piece first put in.

The whole must then be thoroughly well damped with water which has been previously boiled, and the cotton-wool pressed firmly against the side of the funnel, thus pressing out most of the water. The filter is then ready for use, and the extract should be poured on to the funnel. It may be necessary to pass it through two or three fresh filters before it becomes sufficiently clear. At first the liquid comes through rapidly, but gradually the filtration becomes very slow. It may, however, be hastened considerably by placing a small funnel inside the large one.

In this case the cotton-wool pad is placed inside the smaller funnel, and the strip reaches down from the larger funnel inside the smaller, lapping over the pad at the bottom. There should be no wool between the two funnels. The filtered liquid may be collected in a scalded enamel vessel, from which it may be transferred after the final filtration to well-scalded and stoppered stone jars or glass bottles through a clean funnel, or by means of a clean enamel or porcelain cup. Prepared in this way the final extract should keep good for at least six weeks if stored in a cool, dark place. It should have no smell other than the meaty odour natural to the vell, and it should not become markedly cloudy or show gas bubbles on its surface.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, SEPTEMBER, 1916.

Ten thousand five hundred and forty-five eggs were laid during the month, an average of 144 per pen. The weather has been ideal for egg production, and the birds have responded liberally. Miss Hinze and J. Zahl divide the monthly prize with 160 eggs each. Another pen laid an equal number, but, owing to the weight not being up to standard, is, under the rules, ineligible for a prize. Several other pens are close up to the leaders. During the last few days broodies have been numerous, several Leghorns being included amongst them. The following are the individual records:—

Competitors.	Breed	Sept	Total.
*T. Fanning	White Leghorns	149	752
*J. Zahl	Do.	160	747
*Mrs. J. H. Jobling, N.S.W.	Black Orpingtons	155	721
*Miss M. Hinze	White Leghorns	160	714
A. Howe	Do.	152	712
*A. T. Coomber	Do.	157	705
G. H. Turner	Do.	151	686
*J. M. Manson	Do.	158	686
Dr. E. C. Jennings	Do.	144	669
W. Meneely	Do.	148	664
*Dixie Egg Plant	Do.	135	659
J. R. Wilson	Do.	155	649
Geo. Tomlinson	Do.	149	646
J. M. Manson	Black Orpingtons	156	638
T. B. Hawkins	White Leghorns	141	637
*J. F. Dalrymple, N.S.W.	Rhode Island Reds	154	630
*A. E. Walters	White Leghorns	148	627
*E. A. Smith	Do.	149	627
W. Lyell	Do.	147	619
Geo. Prince	Do.	150	617
*E. F. Dennis	Do.	145	616
S. B. Tutin	Do.	144	613
Mrs. Munro	Do.	154	608
Mrs. W. D. Bradburne, N.S.W.	Do.	151	607
A. W. Bailey	Do.	145	602
T. Taylor	Do.	146	596
H. W. Broad	Do.	146	596
T. E. Jarman, N.S.W.	Do.	139	593
Kelvin Poultry Farm	Do.	154	593
H. Jobling, N.S.W.	Black Orpingtons	138	587
Cowan Bros., N.S.W.	Do.	135	587
R. Burns	S. L. Wyandottes	148	584
*C. Knoblauch	White Leghorns	144	580
*W. L. Forrest, N.S.W.	Do.	145	576
A. F. Camkin, N.S.W.	Do.	134	575
C. P. Buchanan	Do.	140	570
*J. H. Gill, Victoria	Do.	134	570
*E. West	Do.	148	569
*Kelvin Poultry Farm	Do.	140	567
F. Clayton, N.S.W.	Do.	141	565
Mrs. C. Davis	Do.	139	564
*W. H. Knowles, junr.	Do.	152	563
A. H. Padman, S.A.	Do.	146	562
P. Brodie	Do.	141	558
Mars Poultry Farm	Do.	142	552

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Sept.	Total.
King and Watson, N.S.W.	White Leghorns	143	541
E. F. Dennis	Black Orpingtons	160	541
E. Pocock	White Leghorns	155	540
W. Purvis, S.A.	Do.	157	540
J. Gosley	Do.	128	535
*J. H. Madrers, N.S.W.	Rhode Island Reds	139	535
*J. Anderson, Victoria	Red Sussex	112	534
J. Anderson, Victoria	White Leghorns	145	528
*J. W. Macrae	Black Orpingtons	151	526
W. Hirst, N.S.W.	White Leghorns	139	522
R. Burns	Black Orpingtons	142	522
T. Fanning	Do.	134	519
F. Clayton, N.S.W.	Rhode Island Reds	146	509
W. Becker	White Leghorns	149	506
Cowan Bros., N.S.W.	Do.	147	503
J. G. Richter	Do.	137	496
Mars Poultry Farm	Black Orpingtons	151	481
W. H. Forsyth, N.S.W.	Do.	116	479
G. W. Holland	White Leghorns	143	462
L. K. Pettit, N.S.W.	Do.	136	436
Harveston Poultry Farm	Do.	142	432
F. W. Leney	Do.	141	418
H. Hammill, N.S.W.	Do.	143	400
W. Lindus, N.S.W.	Do.	130	391
A. T. Coomber	Sicilian Buttercups	134	387
Moritz Bros., S.A.	White Leghorns	146	386
F. W Leney	Rhode Island Reds	138	361
E. F. Dennis	White Wyandottes	132	342
Totals		10,545	41,330

* Indicates that the pen is engaged in single hen test.

RESULTS OF SINGLE HEN TEST.

Competitors.	A.	B.	C.	D.	E.	F.	Total
T. Fanning	130	135	134	133	117	103	752
J. Zahl	117	124	135	117	127	127	747
Mrs. Jobling	137	147	94	125	97	121	721
Miss Hinze	125	106	141	109	120	113	714
A. T. Coomber	126	133	122	98	106	120	705
J. M. Manson	100	140	106	108	130	102	686
Dixie Egg Plant	149	134	132	123		121	659
J. F. Dalrymple	108	90	127	73	116	116	630
A. E. Walters	114	133	97	87	119	77	627
E. A. Smith	131	108	99	124	80	85	627
E. F. Dennis	93	129	78	118	108	90	616
C. Knoblauch	101	100	86	83	104	106	580
W. L. Forrest	106	107	52	118	108	85	576
J. H. Gill	71	100	80	128	98	93	570
E. West	127	112	76	82	77	95	569
Kelvin Poultry Farm	92	81	100	75	123	96	567
W. H. Knowles, junr.	99	84	99	76	103	102	563
J. H. Madrers	71	113	106	98	84	63	535
J. Anderson	107	82	117	35	119	74	534
J. W. Macrae	58	126	109	79	70	84	526

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, OCTOBER, 1916.

Ten thousand six hundred and seventy-four eggs were laid during the month, an average of over 146 per pen. The weather has been very favourable for egg production. Mr. J. M. Manson's White Leghorns win the monthly prize with 167 eggs, closely followed by Cowan Bros. (166) and J. R. Wilson (165), all with White Leghorns. The following are the individual records:—

Competitors.	Breed.	Oct.	Total.
*T. Fanning	White Leghorns	157	909
*J. Zahl	Do.	155	902
*Miss Hinze	Do.	158	872
*A. T. Coomber	Do.	159	864
A. Howe, N.S.W.	Do.	152	864
*J. M. Manson	Do.	167	853
*Mrs. J. H. Jobling, Plattsburg, N.S.W.	Black Orpingtons	127	848
G. H. Turner	White Leghorns	159	845
W. Meneely	Do.	159	823
Dr. E C. Jennings	Do.	148	817
J. R. Wilson	Do.	165	814
Geo. Tomlinson	Do.	162	808
*Dixie Egg Plant	Do.	132	791
J. M. Manson	Black Orpingtons	151	789
*A E. Walters	White Leghorns	160	787
*E. A. Smith	Do.	155	782
*E. F. Dennis	Do.	163	779
T. B. Hawkins	Do.	141	778
Mrs Munro	Do.	158	766
*J. F. Dalrymple, N.S.W.	Rhode Island Reds	136	766
W. Lyell	White Leghorns	145	764
Geo. Prince	Do.	141	758
Mrs. W. D. Bradburne, N.S.W.	Do.	150	757
A. W. Bailey	Do.	150	752
T. Taylor	Do.	151	747
Kelvin Poultry Farm	Do.	152	745
T. E. Jarman, N.S.W.	Do.	148	741
H. W. Broad	Do.	145	741
S. B. Tutin	Do.	121	734
R. Burns	S.L. Wyandottes	143	727
Cowan Bros., N.S.W.	Black Orpingtons	140	727
*J. H. Gill, Victoria	White Leghorns	154	724
H. Jobling, N.S.W.	Black Orpingtons	137	724
*C. Knoblauch	White Leghorns	144	724
*E. West	Do.	154	723
*W. H. Knowles, junr.	Do.	154	717
*W. L. Forrest, N.S.W.	Do.	138	714
A. F. Camkin, N.S.W.	Do.	139	711
*Kelvin Poultry Farm	Do.	144	711
P. Brodie	Do.	150	708
F. Clayton, N.S.W.	Do.	142	707
W. Purvis, S.A.	Do.	164	704
C. P. Buchanan	Do.	133	703
Mrs. C. Davis	Do.	138	702
Mars Poultry Farm	Do.	149	701
A. H. Padman, S.A.	Do.	135	697
E. F. Dennis	Black Orpingtons	151	692

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Oct.	Total.
E. Pocock	White Leghorns	152	692
King and Watson, N.S.W.	Do.	149	690
J. Anderson, Victoria	Do.	153	681
T. Fanning	Black Orpingtons	154	673
Cowan Bros., N.S.W.	White Leghorns	166	669
W. Hirst, N.S.W.	Do.	147	669
W. Becker	Do.	159	665
*J. H. Madrers, N.S.W.	Rhode Island Reds	128	663
*J. W. Macrae	Black Orpingtons	134	660
R. Burns	Do.	134	656
*J. Anderson, Victoria	Red Sussex	121	655
J. Gosley	White Leghorns	114	649
F. Clayton, N.S.W.	Rhode Island Reds	137	646
J. G. Richter	White Leghorns	149	645
Mars Poultry Farm	Black Orpingtons	146	627
C. W. Holland	White Leghorns	159	621
W. H. Forsyth, N.S.W.	Black Orpingtons	122	601
Harveston Poultry Farm	White Leghorns	143	575
L. K. Pettit, N.S.W.	Do.	131	567
F. W. Leney	Do.	147	565
H. Hammill, N.S.W.	Do.	151	551
Moritz Bros., S.A.	Do.	159	545
W. Lindus, N.S.W.	Do.	149	540
A. T. Coomber	Sicilian Buttercups	135	522
F. W. Leney	Rhode Island Reds	135	496
E. F. Dennis	White Wyandottes	124	466
Totals	...	10,674	52,004

Indicates that the pen is taking part in single hen competition.

RESULT OF SINGLE HEN TESTS.

Competitors.	A.	B	C	D.	E.	F.	Total.
T. Fanning	157	161	161	162	141	127	909
J. Zahl	140	151	164	143	152	152	902
Miss Hinze	148	133	170	135	148	138	872
A. T. Coomber	152	159	151	124	130	148	864
J. M. Manson	128	167	133	135	159	131	853
Mrs. J. Jobling	162	172	117	141	115	141	848
Dixie Egg Plant	172	160	162	150	...	147	791
A. E. Walters	142	160	125	111	143	106	787
E. A. Smith	158	136	126	151	102	109	782
E. F. Dennis	118	155	106	147	137	116	779
J. F. Dalrymple	124	115	151	102	142	132	766
J. H. Gill	95	125	109	153	126	116	724
C. Knoblauch	119	127	111	108	129	130	724
E. West	154	138	103	109	99	120	723
W. H. Knowles, junr.	121	111	123	102	133	127	717
W. L. Forrest	133	134	52	146	136	113	714
Kelvin Poultry Farm	113	109	124	97	151	117	711
J. H. Madrers	87	132	135	120	105	84	663
J. W. Macrae	80	149	129	107	93	102	660
J. Anderson	127	101	143	57	136	91	655

General Notes.

INCIDENCE OF THE NEW SCHEME OF TAXATION.

The new taxation proposals of the Commonwealth Government provide for an increase of 25 per cent. in the rate of the war income tax imposed last year. To set out for public information what the effect of this will be on individuals, the subjoined table has, at our request, been prepared for us ("Brisbane Courier").

Assuming a man had an income of £300 from personal exertion, and his ordinary deductions were £50, that would leave an income of £250. Presuming the exemption will be £100, he would then have a taxable income of £150. Under the old rate, the income tax payable would be £2 4s. 6d.; if 25 per cent. be added to the tax he would pay £2 15s. 7d. (the new rate).

In the case of incomes from property, the old and the new rates would be, respectively, £2 7s. 10d. and £3 9s. 9d., as shown in the property column of figures.

Statement showing the amount of Federal income tax payable under the old and proposed new rates after allowance of all usual deductions as well as the statutory exemption, which it is intended to reduce:—

Taxable Income.	Personal Exertion.						Property					
	Old Rate.			New Rate.			Old Rate.			New Rate.		
	Tax.			Tax.			Tax.			Tax.		
£	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d
150	2	4	6	2	15	7	2	7	10	3	9	9
200	3	2	6	3	18	1	3	8	5	4	5	6
250	4	2	0	5	2	6	4	11	3	5	14	10
300	5	3	1	6	8	10	5	16	5	7	5	6
350	6	5	9	7	17	2	7	3	11	8	19	11
400	7	10	0	9	7	6	8	13	8	10	17	1
450	8	15	9	10	19	8	10	5	8	12	17	1
500	10	3	1	12	13	10	12	0	1	15	0	1
550	11	12	0	14	10	0	13	17	8	17	7	1
600	13	2	6	16	8	1	16	8	9	20	10	11
650	14	14	6	18	8	1	19	4	0	24	0	0
700	16	8	1	20	10	1	22	3	2	27	13	11
750	18	3	3	22	14	0	25	6	3	31	12	10
800	20	0	0	25	0	0	28	13	2	35	16	5
850	21	18	3	27	7	9	32	3	10	40	4	9
900	23	18	1	29	17	7	35	18	2	44	17	8
950	25	19	6	32	9	4	39	16	2	49	15	2
1000	28	2	6	35	3	1	43	17	9	54	17	2
2000	87	10	0	109	7	6	157	15	7	197	4	6
3000	178	2	6	222	13	1	323	13	7	404	12	0
4000	300	0	0	375	0	0	529	14	5	662	3	0
5000	453	2	6	566	8	0	760	18	1	951	2	7
6000	637	10	0	796	17	6	1,005	11	1	1,256	18	10

A CHEAP AND EFFECTIVE HAND BORING PLANT.

Contributed by Messrs. J. H. Bestmann and W. E. Bevan, Water Finders under the Lands Department.

The main desire of every man on the land is to obtain a permanent supply of water. Water being essential to either the farmer or grazier, he naturally, when choosing an area, endeavours to obtain one with a permanent creek or spring thereon. This unfortunately cannot always be obtained, hence there are many areas of good agricultural and grazing areas which are termed "dry."

To overcome this state of affairs the services of reputable water diviners are often obtained, and when a site has been located, either a bore or a well is sunk to tap the sub-artesian flows which, in practically every case, exist upon these areas.

To facilitate the finding of these sites the Queensland Government has appointed two water finders, whose duty it is to locate water with the aid of the rod and automatic water finder.

A site having been decided on, it is necessary to either sink a well or, in cases where the streams are too deep, to sink a bore. The latter is usually the preferable alternative.

Now, in many cases the farmer is either unable to wait for a boring plant to come along or is unable to pay for a bore being put down. In such circumstances the hand boring plant here shown will be found most effective, and can be constructed by a handy man. The idea was obtained from a selector in the Yamala district, Mr. Frank Ponton, who, being of an inventive turn of mind, constructed a similar plant for his own use, and finding it very successful, he was pleased to give the writers the idea for publication, so that it may aid some of his fellow-settlers on the land.

With a 3-inch sinker bar and jars Mr. Ponton sunk one hole for 5-inch casing 156 ft. through rock and clay, and upon another site he, with two others, sunk a hole 326 ft., 100 ft. of rock and clay and 226 ft. layers of hard slate shale and blue rock. In both bores Mr. Ponton averaged 12 ft. 6 in. per day, the biggest day being 18 ft. 10 in.

These results, we think, are sufficient to show the effectiveness of the plant. We have endeavoured to show the construction plainly upon the plan and specification, which it is hoped will be found to explain itself. If it is not quite understood, however, we shall be pleased to give any further information.

SPECIFICATION FOR A SPRING POLE HAND BORING PLANT.

The plant as shown is built of rough bush timbers. The shearlegs consist of four saplings, each 26 ft. long, 6 in. diameter at foot, and tapering to not less than 4 in. at head. The head is secured with a 1-in. bolt passing through the four legs. It is as well to either bind or put a small bolt through each head at right angles to the main bolt to prevent splitting.

Suspended on this main bolt, and hanging between the central and outside legs, is a wrought-iron "D" to carry two 6-in. pulleys. These pulleys take the sand pump line and the drill cable. The foot of each leg should rest on a solid foundation and be prevented from spreading by four saplings laid round the outside of same and pinned together with wooden pins. The two front legs should be 14 ft. apart and the two back ones 4 ft. apart and a space of 14 ft. between the front and back pair.

A set of "rungs" to form a ladder are now to be secured to the outside of the back legs. As shown on plan, set four uprights 2 ft. 6 in. in ground to form a frame to receive two windlasses, one for the sand line and the other for the drill cable. The top rails are to be mortised and tenoned and bolted with ½-in. bolts to these uprights and to the back shearlegs. An effective brake when lowering sand pump or drill can be made by using a sapling over the back rail and under the windlass. It is also necessary to drill holes in the side rails for the insertion of a bolt to be used as a stop against the windlass handles.

The spring pole is to be 30 ft. long, of ironbark or spotted gum, to be 4 in. diameter at smallest end, to be shaped and let well into a tree at heel and 8 ft. from ground. This heel in turn is kept in place by a bolt passing through the tree and heel.

Eight feet from the tree, at a height of 10 ft. from the ground, the spring pole is supported on a cross-tree. The cross-tree is constructed of 6-in. saplings bolted together, as shown on plan, and the toes let into a log which has been flattened on two sides. The cross-tree is kept in place by the weight of the pole and a chain round the tree and the cross-tree, to prevent it from sliding forward. A sapling against the foot of tree and leaning against the cross-tree just under the chain will prevent the cross-tree from slipping back, but owing to the angle of the pole this may not be found necessary, as the tendency is to slip out at the top. As the drill descends and the weight increases, the cross-trees can now be moved further out to stiffen the spring of the pole.

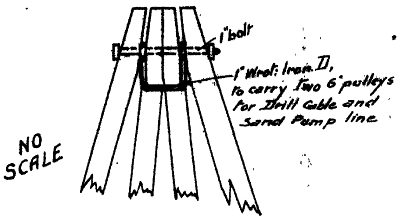
At the extreme end of pole, and level with the heel of shearlegs, secure a short rope and cross bar at a convenient height to the person about to work the pole. Directly under the point where the heads of the legs meet secure a ¾ ring and bolt; from this ring suspend a chain and clamp as shown. The drill cable is secured to the clamps, and when drilling the drill can be lowered by taking the weight on the windlass and dropping the drill another link, as shown on plan, and only when you have reached the end of the chain is it necessary to take a fresh hold of the rope in the clamp.

Together with the above construction the following gear is required:—

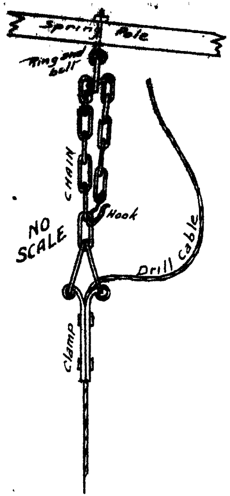
Set of 3-in. jars, one 3-in. sinker, bar, 6-in. drill (under cutting), 6-in. star drill, 6-in. drill chisel point, 6-in. earth socket, 6-in. reamer bit, 5-in. sand pump, 300 ft. drilling cable, 300 ft. sand pump line, together with all necessary spanners, pipe tongs, casing clamps, &c. A small blacksmith's portable forge and tools for doing up drills.

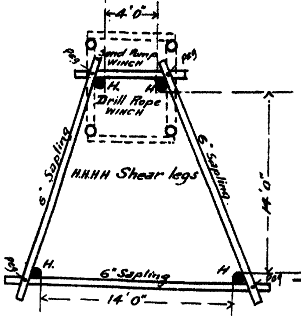
SPRING POLE PLANT
FOR
HAND BORING

Scale 8 feet to an Inch

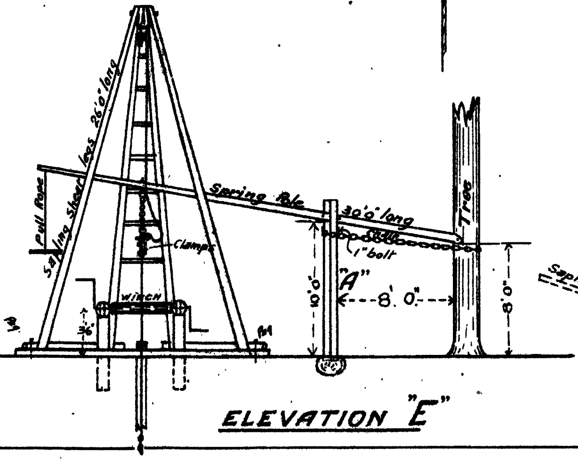

NO SCALE
1"bolt
1" Wrot: Iron II, to carry two 6" pulleys for Drill Cable and Sand Pump line

Plan showing construction at head of legs.

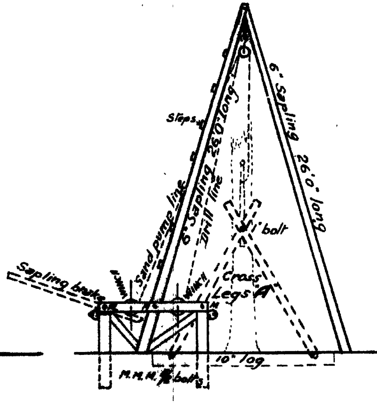




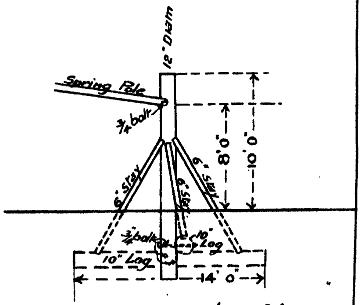
PLAN



ELEVATION "E"



ELEVATION "B"



Construction in lieu of tree

W.E.B.

SIMPLE STILLS FOR ESSENTIAL OILS.

Some weeks ago we were asked by a correspondent to furnish a description of a cheap form of still for extracting essential oil from various herbs and leaves. At the time we were unable to do so, but we have just received a copy of the "Agricultural News," of Barbados, West Indies, which describes and illustrates what seems to us to be the kind of still our correspondent wished to procure. The description is as follows:—

"With increasing attention to the production of the essential oil of Bay leaf and other essential oils, there arises a demand for a convenient type of still. In the 'West Indian Bulletin,' vol. IX., p. 276, suggestions were made for simple stills, two forms being described. Both types have been in experimental use for a number of years. As the result of this experience, it is found that the simple still of the first type there described is quite satisfactory in operation, but it has the defect that it soon corrodes and has to be entirely renewed.

"It occurs to the writer to suggest that if the still is constructed in segments, the corroded parts may be readily renewed at little expense and with little loss of time. Furthermore, should it be required to increase the capacity of the still, this may be done by adding segments.

"A still of the kind suggested is shown in the accompanying illustration. It consists of segments formed by riveting sheet-iron to rings of angle-iron, thus forming hollow drums which can be bolted together one on top of the other until a still of the required capacity is constructed. The bolts connecting the segments can be disconnected at any time for the replacing of a segment, while the joints between the rings can be made tight in the usual manner with asbestos or other packing.

"The sides of the drums may be made of sheet-iron of ⅛-in. thickness.

"The bottom of the still should be made of thicker material, and may be of ¼- or ⅜- in. iron sheet. In mounting the still over the fireplace, the ring with the bolts should be embedded in the mason work so as to protect it from the direct action of the fire. This will reduce the difficulty of removing the bolts when it becomes necessary to renew the bottom plate.

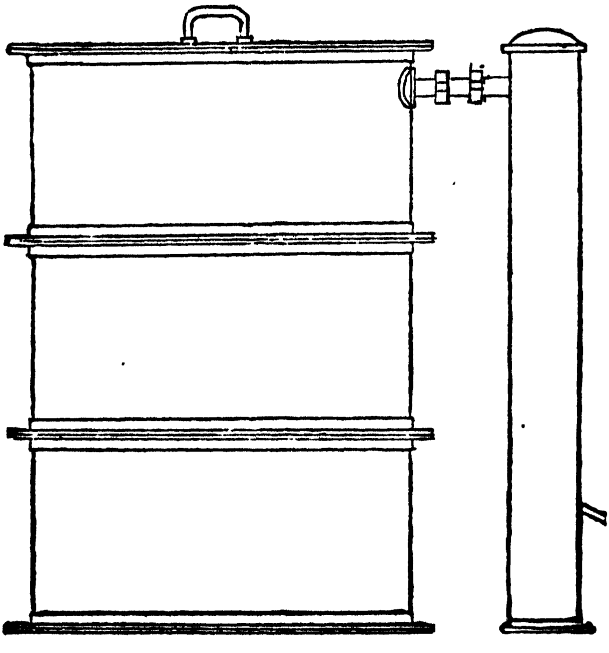
"The top of the still should also be made of ¼-in. to ⅜-in. iron sheet; it should be held in place by bolts and nuts (not shown in the drawing); these should be placed sufficiently close together to make a good joint, which may also be fitted with asbestos packing. A coating of blacklead on the cover will prevent this from sticking to the asbestos, and in this way the joint may be broken and renewed without difficulty.

"If the top bolts are permanently fixed in the angle-iron ring they will always be in place, and cannot be lost; the nuts may be winged so as to enable them to be screwed down by hand without the use of a spanner.

"Connection with the condenser may be made through the side of the upper segment and near the top. This is preferable to making the connection through the cover, for in this way the joint has not to be broken when the cover is removed.

"In the drawing the still is shown connected to an 'Ideal' condenser. As this is made of copper, it is suggested that the connection between the still and condenser should be made by means of a short length of flanged pipe made of vulcanite, so as to obviate galvanic action, which would be induced by the contact of iron and copper, and would lead to the corrosion of the still.

"The still is operated in the manner described in the 'West Indian Bulletin' above referred to. A perforated grating is fixed in the bottom segment at a convenient distance from the bottom; a sufficient quantity of water is placed at the bottom of the still, and the leaves or other material placed above the grating. For convenience in handling and removing, the leaves may be contained loosely in cages or baskets of iron wire; these baskets can be lifted out by means of the same hoist which is used to remove the cover, and this can be done without waiting for the still to cool.



"The hoist referred to may consist of a simple wooden tripod standing over the still, and provided with a pulley and hoisting rope.

"If the discharge orifice of the condenser can be placed at a height of some 3 ft. or so above the level of the water in the still, it is possible to arrange that the distilled water separating from the oil in the Florentine flask, commonly used as the collecting vessel, may be conducted by a pipe directly back to the still, thus maintaining a constant water-level in the still and obviating the risk of burning from lack of water; at the same time, it automatically leads to the recovery of any essential oil that may inadvertently escape in the waste water. To effect this, the condenser should be placed relatively much higher than is shown in the accompanying drawing. This may readily be done by lengthening the pipe connecting the still with the condenser. "F.W."

Apropos of the above, the following note on the extraction of oil from Eucalyptus leaves was lately published in the "Daily Mail," Brisbane:—

"A novel and truly Australian 'trade,' suitable for women, is the extraction of eucalyptus from the leaves of the gum-tree. Miss Roberts, of the Technical College, recently appealed to women to grow things and to make things, so that we would keep money in the country. 'Every woman in Australia must become a producer,' she said, 'and so lessen the amount of money sent out of the country.' Miss Roberts stated that a woman could earn £2 a week by extracting eucalyptus oil from the leaves.

"There are many examples throughout the State of sisters going in for farming, especially in the Moss Vale, Monaro, and Yass districts. As the work of eucalyptus-getting is clean and healthy, and not strenuous, there are great possibilities in it for women, and it would be very suitable for sisters. At present the majority of those who go in for this novel work use the most primitive tools imaginable. One outfit in the Cootamundra district a few years ago consisted of little beyond a few oil drums and kerosene tins.

"As very good oil is extracted from the suckers and from the younger leaves of saplings, there would be no occasion for a woman to climb the trees to get the leaves, though if she preferred the more mature leaves a bushwoman would be quite capable of that, if necessary. The blue gum is one of the best for the purpose.

"The leaves are cut and brought to a watercourse, where they are boiled. A large-sized copper or one of those galvanised iron tanks so common in country districts is most suitable. It must have a closely-fitting lid, as the steam which rises from the 'brew' is charged with the oil. This steam is led out of the copper by means of a pipe, which is bent down so as to run along the creek bed for a while. The cold waters on the pipe condense the steam within, and it falls into a vessel placed ready. The oil rises to the top and the water stays at the bottom of the drum or tin. Here we have the pure extract of eucalyptus. But the eucalyptus of commerce has various mixtures added to it. The oil as it is found in the tin brings about 6d. per lb. Two men working in a good area, with very primitive tools, are known to make from 12s. to 18s. a day without difficulty. This occupation would be just the thing for a woman whose health required her to live out of doors."

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR OCTOBER, 1916.

Article.		OCTOBER.
		Prices.
Bacon	lb.	9d. to 11d.
Barley	bush.	...
Bran	ton	£5
Broom Millet	,,	£18 to £25
Butter	cwt.	139s. 4d.
Chaff, Mixed	ton	£3
Chaff, Oaten	,,	£4 15s. to £5 10s.
Chaff, Lucerne	,,	£3 to £5 5s.
Chaff, Wheaten	,,	£3 15s. to £4 10s.
Cheese	lb.	9½d. to 10d.
Flour	ton	£12 5s.
Hams	lb.	1s. 3d. to 1s. 4d.
Hay, Oaten	ton	..
Hay, Lucerne	,,	£2 to £2 15s.
Honey	lb.	5d. to 6d.
Maize	bush.	3s. 6d. to 3s. 7½d.
Oats	,,	3s. 6d. to 4s.
Onions	ton	£6 to £7 10s.
Peanuts	lb.	3d. to 4d.
Pollard	ton	£5 15s.
Potatoes	,,	£9 to £11 10s.
Potatoes (Sweet)	cwt.	2s. 6d. to 4s.
Pumpkins (Cattle)	ton	£1 5s to £1 10s.
Eggs	doz.	8d. to 10d.
Fowls	pair	5s. 6d. to 7s.
Ducks, English	,,	4s. 9d. to 5s. 6d.
Ducks, Muscovy	,,	6s. 6d. to 7s. 6d.
Geese	,,	6s. to 8s. 6d.
Turkeys (Hens)	,,	10s. to 13s.
Turkeys (Gobblers)	,,	16s. to 25s.
Wheat	bush.	5s. to 5s. 3d.

VEGETABLES—TURBOT STREET MARKETS.

Cabbages, per dozen	6d. to 2s. 6d.
Beans, per sugar bag	9d. to 2s.
Beetroot, per dozen bunches	9d. to 1s.
Carrots, per dozen bunches	4d. to 9d.
Cauliflowers, per dozen	1s. to 5s.
Chocos, per quarter-case	1s. 6d. to 2s.
Celery, per bundle	1s. 3d. to 1s. 9d.
Cucumbers, per dozen	...
Custard Marrows, per dozen	1s. to 2s.
Vegetable Marrows, per dozen	1s. to 2s.
Lettuce, per dozen	4d. to 9d.
Parsnips, per dozen bunches	...
Peas, per sugar bag	1s. to 3s. 3d.
Sweet Potatoes, per sugar bag	1s. 3d. to 2s.
Table Pumpkins, per dozen	1s. 8d. to 3s.
Tomatoes, per quarter-case	5s. 6d. to 10s. 6d.
Turnips, per dozen bunches	4d. to 6d.
Rhubarb, per dozen bundles	6d. to 1s.

SOUTHERN FRUIT MARKETS.

Article.	SEPTEMBER.
	Prices.
Bananas (Queensland), per case	11s. to 14s.
Bananas (Fiji), per case	14s. 6d. to 15s. 6d.
Bananas (G.M.), per case	16s. to 18s.
Custard Apples, per tray	4s. to 6s.
Mandarins, per case	9s. to 15s.
Mangoes, per case	...
Oranges (Navel), per case	12s. to 18s.
Oranges (other), per case	6s. to 9s.
Passion Fruit, per half-case	4s. 6d. to 5s.
Lemons (Local), per bushel case	6s. to 10s.
Papaw Apples, per bushel-case	7s. to 9s.
Persimmons, per half-case	...
Pineapples (Queens), per double-case	8s. to 9s.
Pineapples (Ripleys), per double-case	6s. to 7s.
Pineapples (Common), per double-case	6s. to 7s.
Tomatoes, per quarter-case	7s. to 8s.
Strawberries (Queensland), per tray	2s. to 3s. 6d.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	OCTOBER.
	Prices.
Apples, per case	10s. to 12s.
Apples, Cooking, per case	7s. 6d. to 8s. 6d.
Bananas (Cavendish), per dozen	1¼d. to 5½d.
Bananas (Sugar), per dozen	1¾d. to 3½d.
Cape Gooseberries, per case	3s. to 5s. 6d.
Citrons, per cwt.	10s.
Cocoanuts, per sack	12s. to 15s.
Cumquats, per quarter-case	3s. 6d. to 4s. 9d.
Custard Apples, per quarter-case	4s. to 6s.
Granadillas, per quarter-case	...
Lemons (Lisbon), per case	7s. to 10s.
Limes, per quarter-case	...
Mandarins, per half-case	10s. to 16s.
Mangoes, per case	...
Oranges, (Navel), per case	12s. to 16s.
Oranges (other), per case	6s. to 9s.
Oranges (Seville), per cwt.	10s. to 12s.
Papaw Apples, per quarter-case	1s. 3d. to 2s.
Passion Fruit, per quarter-case	6s. to 10s.
Peaches, per quarter-case	...
Pears, per half-bushel case	7s. to 11s.
Peanuts, per pound	3d. to 4d.
Persimmons, per quarter-case	...
Plums, per case	...
Pineapples (Ripleys), per dozen	1s. 6d. to 2s. 9d.
Pineapples (Rough), per dozen	6d. to 1s.
Pineapples (Smooth), per dozen	1s. 6d. to 3s.
Quinces, per case	...
Rockmelons, per dozen	...
Rosellas, per sugar-bag	...
Strawberries, per dozen boxes	2s. to 5s.
Tomatoes, per quarter-case	5s. 6d. to 10s. 6d.
Piemelons, per cwt.	7s. to 8s.
Watermelons, per dozen	...

TOP PRICES, ENOGGERA YARDS, SEPTEMBER, 1916.

Animal.	SEPTEMBER. Prices.
Bullocks	£18 10s. to £22
Bullocks (Single)	...
Cows	£11 12s. 6d. to £13 15s.
Merino Wethers	35s.
Crossbred Wethers	40s. 3d.
Merino Ewes	26s. 6d.
Crossbred Ewes	30s. 9d.
Lambs	31s. 9d.
Pigs (Porkers)	...
Pigs (Slips)	...

LONDON QUOTATIONS.

London, 7th October.

Danish butter has recovered to 210s. per cwt., though little business is being done.

The market for frozen rabbits is steady, and prices are unchanged.

Hemp, December-February shipment, is quoted at £49 10s. per ton.

Rubber: Fine, hard Para, 3s. 2½d. per lb.; plantation, first latex crepe, 2s. 4⅞d.; smoked sheet, 2s. 4⅜d.

Copra, South Sea, September-October shipment, £32 5s. per ton.

Raw linseed oil, spot pipes, £39 5s. per ton.

The Liverpool quotation for middling American cotton, October-November shipment, is 9·79d. per lb.

The jute market is firm. September-October shipment from Calcutta is quoted at £34 per ton.

Hemp is firm. October-December shipment, £50.

Rubber, fine, hard Para, 3s. 3d. per lb.; plantation, first latex crepe, 2s. 5⅜d.; smoked sheet, 2s. 4⅞d.

Copra, South Sea, October-December shipment, £33 10s. per ton.

Raw linseed oil, spot pipes, £39 10s. per ton.

The Liverpool quotation for middling American cotton, October-November shipment, is from 10d. to 9.11d. per lb.

SEA ISLAND COTTON MARKET.

In reference to the sales of West Indian Sea Island cotton in Liverpool, Messrs. Wolstenholme and Holland state in their report, dated 24th July, 1916, as follows:—

"A fair business has been done in West Indian Sea Island since our last report, most of the sales having been delivered on the forward contract. About 200 bales have been sold, chiefly Antigua 13d. to 16¾d., Virgin Islands 15½d., St. Eustatius 13d. to 16½d., together with a few superior St. Kitts at 20d. Prices generally are firm."

HEMP MARKET.

Messrs. Landauer and Co., London, in their last fortnightly market report, state that Mexican sisal continues to be without interest as far as the European markets are concerned. Mauritius hemp (Furcrea)—spot values, £46 to £47 per ton for prime and £44 to £45 for medium quality. British East African sisal—sales have been made at £50 to £53 per ton, according to quality. Tow, £31 to £37 10s. per ton.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET AT BRISBANE AND THE PHASES OF THE MOON FOR THE THIRD FOUR MONTHS OF 1916.

Date.	SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·3	5·33	5·29	5·47	4·59	6·5	4·46	6·28
2	6·2	5·33	5·28	5·48	4·58	6·6	4·46	6·29
3	6·1	5·34	5·27	5·48	4·57	6·7	4·46	6·29
4	6·0	5·34	5·26	5·49	4·56	6·8	4·46	6·30
5	5·59	5·35	5·25	5·49	4·55	6 8	4·46	6·31
6	5·58	5·36	5·24	5·50	4·55	6·9	4·46	6·31
7	5·57	5·36	5·23	5·50	4·54	6·10	4·46	6·32
8	5·56	5·37	5·22	5·51	4·54	6·10	4·46	6·33
9	5·55	5·37	5·20	5·51	4·53	6·11	4·47	6 34
10	5·54	5·38	5·19	5·52	4·52	6·11	4·47	6·34
11	5·53	5·38	5·18	5·52	4·52	6·12	4·47	6·35
12	5·52	5·39	5·17	5·53	4·51	6·12	4·47	6·36
13	5·51	5·39	5·16	5·53	4 51	6·13	4·47	6·36
14	5·50	5·40	5·15	5·54	4·50	6·13	4·48	6·37
15	5·48	5·40	5·14	5·54	4·50	6·14	4·48	6·38
16	5·47	5·41	5·13	5·55	4·50	6·15	4·48	6·38
17	5·46	5·41	5·12	5·56	4·49	6·16	4·49	6·39
18	5·45	5·41	5·11	5·56	4·49	6·17	4·49	6·40
19	5·43	5·42	5·10	5·57	4·48	6·18	4·49	6·40
20	5·42	5·42	5·9	5·57	4·48	6·19	4·50	6·41
21	5·41	5·43	5·8	5·58	4·47	6·20	4·50	6·41
22	5·40	5·43	5·7	5·58	4·47	6·21	4·51	6·42
23	5·38	5·44	5·6	5·59	4·47	6·22	4·51	6·42
24	5·37	5·44	5·5	5·59	4·47	6·23	4·52	6·43
25	5·36	5·44	5·5	6·0	4·47	6·23	4·52	6·43
26	5·35	5·45	5·4	6·1	4·46	6·24	4·53	6·44
27	5·34	5·45	5·3	6·1	4·46	6·25	4·53	6·44
28	5·33	5·46	5·2	6·2	4·46	6·25	4·54	6·45
29	5·32	5·46	5·1	6·3	4·46	6·26	4·55	6·45
30	5·30	5·47	5·0	6·3	4·46	6·27	4·55	6.46
31	..	..	5·0	6·4	...	...	4·56	6·46

The Phases of the Moon commence at the times stated below in Queensland, New South Wales, Victoria, and Tasmania.

		H.	M.
5 Sept.	☾ First Quarter	2	26 p.m.
12 „	○ Full Moon	6	31 a.m.
19 „	☽ Last Quarter	3	35 p.m.
27 „	● New Moon	5	34 „

The moon will be nearest the earth on the 9th at 11·24 p m , and farthest from the earth on the 21st at 7 36 p.m.

4 Oct.	☾ First Quarter	9	0 p.m.
11 „	○ Full Moon	5	1 „
19 „	☽ Last Quarter	11	8 a.m.
27 „	● New Moon	6	37 „

The moon will be nearest the earth on the 7th at 8 30 a m., and on the 19th, at 3·12 p.m., at its farthest distance.

3 Nov.	☾ First Quarter	3	50 a.m.
10 „	○ Full Moon	6	18 „
18 „	☽ Last Quarter	8	0 „
25 „	● New Moon	6	50 p.m.

The moon will be nearest the earth on the 1st at 4·48 a.m., and on the 28th at 5·42 a.m.; it will be farthest from the earth on the 16th at noon.

2 Dec.	☾ First Quarter	11	55 a.m.
9 „	○ Full Moon	10	44 p.m.
18 „	☽ Last Quarter	4	6 a.m.
25 „	● New Moon	6	31 „
31 „	☾ First Quarter	10	7 p.m.

The moon will be farthest from the earth on the 14th at 6·48 a.m., and nearest on the 26th at 10·30 a.m.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise and sunset are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during September, October, November, and December may be roughly arrived at by adding 16 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

A fair approximation to the times of sunrise and sunset at Rockhampton can be obtained for November by adding 16 minutes to the Brisbane time for sunrise but only 4 minutes to the Brisbane time for sunset.

These figures will not do for other months; for example, in June 1 minute should be added for sunrise and 19 minutes for sunset.

Clocks at Rockhampton should give the same time as at Brisbane; the standard time being the same throughout Queensland, New South Wales, and Victoria. The same standard time was used in Tasmania till the introduction of the daylight saving principle.

The following table gives the times of sunrise and sunset at Rockhampton for November:—

ROCKHAMPTON, 1916.

Date.	Rises.	Sets.	Date.	Rises.	Sets.
1 November	5·14	6·9	16 November	5·5	6·20
2 ,, ..	5·13	6·10	17 ,, ..	5·5	6·21
3 ,, ..	5·12	6·11	18 ,, ..	5·5	6·22
4 ,, ..	5·11	6·12	19 ,, ..	5·5	6·22
5 ,, ..	5·11	6·13	20 ,, ..	5·5	6·23
6 ,, ..	5·10	6·13	21 ,, ..	5·5	6·23
7 ,, ..	5·9	6·14	22 ,, ..	5·4	6·24
8 ,, ..	5·9	6·14	23 ,, ..	5·4	6·25
9 ,, ..	5·8	6·15	24 ,, ..	5·4	6·25
10 ,, ..	5·8	6·15	25 ,, ..	5·4	6·26
11 ,, ..	5·7	6·16	26 ,, ..	5·4	6·26
12 ,, ..	5·7	6·17	27 ,, ..	5·4	6·27
13 ,, ..	5·6	6·18	28 ,, ..	5·4	6·28
14 ,, ..	5·6	6·19	29 ,, ..	5·4	6.29
15 ,, ..	5·6	6·20	30 ,, ..	5·4	6·30

Statistics,

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF SEPTEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING SEPTEMBER, 1916 AND 1915, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Sept.	No. of Years' Records.	Sept., 1916.	Sept., 1915.
North Coast.	In.		In.	In.
Atherton	0·54	15	1·70	Nil
Cairns	1·65	34	4·50	Nil
Cardwell	1·44	44	2·36	0·10
Cooktown	0·56	40	0·47	0·04
Herberton	0·46	29	1·42	0·04
Ingham	1·09	24	0·75	0·24
Innisfail	3·58	35	6·49	Nil
Mossman	1·38	1	3·36	Nil
Townsville	0·81	45	0·03	0·06
Central Coast.				
Ayr	1·79	29	0·15	0·48
Bowen	0·87	45	0·84	0·01
Charters Towers ...	0·85	34	0·03	0·50
Mackay	1·59	45	0·44	0·20
Proserpine	2·15	13	3·32	0·01
St. Lawrence ...	1·38	45	0·27	1·71
South Coast.				
Biggenden	1·66	17	2·25	2·65
Bundaberg	1·81	33	4·23	0·28
Brisbane	2·04	65	2·81	1·57
Childers	1·98	21	3·24	3·28
Crohamhurst ...	2·34	23	5·18	4·93
Esk	2·26	29	2·85	2·36
Gayndah	1·58	45	1·46	1·04
Gympie	2·10	46	4·03	3·18
Glasshouse M'tains	1·71	8	3·13	2·76
Kilkivan	1·75	37	1·69	0·79
Maryborough ...	1·94	45	3·81	2·94
South Coast— continued:	In.		In.	In.
Nambour	2·28	20	5·06	3·17
Nanango	1·83	34	2·98	2·43
Rockhampton ...	1·35	29	0·92	2·33
Woodford	2·12	29	3·77	2·71
Darling Downs.				
Dalby	1·78	46	0·86	1·55
Emu Vale	1·79	20	2·34	0·67
Jimbour	1·62	28	0·50	1·20
Miles	1·41	31	0·45	0·93
Stanthorpe ...	2·47	43	1·80	1·81
Toowoomba ...	2·19	44	3·63	0·83
Warwick	1·88	29	1·32	0·61
Maranoa.				
Roma	1·54	42	0·77	0·67
State Farms, &c.				
Bungeworgorai ...	0·77	4	0·77	0·91
Gatton College ...	1·54	17	1·84	1·12
Gindie	0·85	17	0·06	1·07
Hermitage ...	1·45	10	1·54	0·73
Kairi	1·21	4	1·76	Nil
Kamerunga ...	1·31	27	4·44	Nil
Sugar Experiment Station, Mackay	1·49	19	...	0·53
Warren	0·24	4	0·53	0·08

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for September this year and for the same period of 1915, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
Divisional Officer.

Farm and Garden Notes for December.

Too much care can scarcely be bestowed upon potatoes dug up this month to protect them from the sun. They should be dug or ploughed out as soon as the skin is firm, as they are liable to rot in the ground owing to the great heat.

FIELD.—The wheat harvest will be now nearing completion, and to all appearance, while the results are not likely to contribute a record, owing to the dry spell in the early stages of the crop, still the subsequent seasonable rains effected a wonderful change in the young crops, which throve amazingly, and in October gave promise of a bountiful crop pretty well all over the wheat districts. Up to the middle of October there were scarcely any signs of rust. The estimates of the probable yield have varied so considerably that it will be well to wait until the entire harvest is over before speculating on the result. This State is a long way from becoming a wheat-exporting country. The principal factor operating against a still greater extension of the wheatgrowing industry is that many farmers who formerly grew wheat and barley have turned their attention to dairying, which offers larger and quicker returns.

Given favourable weather, maize, panicum, imphee, kafir corn, and the various millets may be sown.

KITCHEN GARDEN.—Gather cucumbers, melons, vegetable marrows, and French beans as soon as they are fit for use. Even if they are not required, still they should be gathered, otherwise the plants will leave off bearing. Seeds of all these may be sown for a succession. Sow cabbage and cauliflower seed. Great difficulty will be experienced in getting these to grow at this season, and the plants will consequently be more valuable in proportion. Tomatoes should be in full bearing, and the plants should be securely trained on trellises or stakes. Take up onions, and spread them out thinly on the barn floor until the tops wither sufficiently to pull off easily. They should then be graded into sizes, and sent to market or stored in a cool place. Where there is an unlimited supply of water, and where shade can be provided, lettuce and other salad plants may still be sown. All vacant ground should be well manured and dug two spits deep. Manure and dig as the crops come off, and the land will be ready for use after the first shower.

FLOWER GARDEN.—Keep the surface of the land well stirred. Do not always stir to the same depth, otherwise you are liable to form a "hard pan," or caked surface, beneath the loose soil. Alternate light with deep hoeings. A few annuals may still be planted, such as balsams, calendulas, cosmos, coreopsis, marigold, nasturtium, portulaca, zinnia, and cockscomb. Plant out whatever amaranthus may be ready. These may still be sown in boxes. Clear away all annuals which have done flowering. Bulbs should have all the dead leaves cut away, but the green leaves should not be touched. Stake chrysanthemums, and, as the flower buds develop, give them weak liquid manure. Coleus may now be planted and propagated from cuttings. Dahlias are in various stages, but the greater part will have been planted by this time. Give them liquid manure, and never let them dry up. Lift narcissus about the end of the year, but do not store them. Plant them out at once in their new positions. Top-dress all lawns.

Orchard Notes for December.

THE SOUTHERN COAST DISTRICTS.

December is somewhat an off month for pines, though bananas should be improving both in quality and quantity. The purely tropical summer ripening fruits are not yet ready, and, consequently, there is only a limited supply of fruit in this part of Queensland during the month.

Early ripening varieties of grapes will mature, and care should be taken to market them in good order. The first fruit to ripen should be put up in small packages, as, if marketed in this manner, it will fetch a better price, but as it becomes more plentiful it can be packed in larger cases.

Pay particular attention during the month to all peaches, apples, pears, Japanese plums, or other fruits that are liable to be attacked by fruit fly, and see that no fly-infested fruits are allowed to lie about under the trees, and thus breed out a great crop of flies that will be ready to destroy the grape and mango crops as they mature.

If the month is dry see that the orchard is kept well worked so as to retain moisture in the soil, and, in any case, even should there be a good rainfall, it is necessary to cultivate in order to keep down weed growth, as if weeds are not kept in check now there is little chance of their being kept in hand once the January and February rains set in.

The planting out of pineapples, bananas, and most kinds of tropical fruits can be carried out during the month, especially if there is any rainy weather; but, if the weather is dry, it is better to defer the planting out of tropical fruits till January or February.

The cyaniding of citrus trees can be continued when necessary, and where Maori or orange mite is showing it should be checked at once, as Maori fruit is of no use for the Southern markets, and is unsuitable for export to the old country,

THE TROPICAL COAST DISTRICTS.

Clean up all orchards and pineapple and banana plantations as long as you have the chance of fine weather, so as to have your land in good order when the wet season commences, as once the rain sets in there is little chance of fighting weeds. Watch bananas carefully for fly, and market the fruit in good order. Handle the crop of pines carefully; don't let the fruit get too ripe, as an over-ripe Northern pine is tasteless. The fruit should be cut as soon as it is fully grown, as even when quite green the rough-leaf varieties have usually developed sufficient sugar to suit most persons' taste. Pack carefully to prevent bruising, and they will carry South in good order.

Only send high-class mangoes South—bad-flavoured sorts, and stringy, carroty, or turpentine flavoured varieties are not worth shipping.. High-class fruit will pay to handle carefully, but there is no demand for rubbish, and I am sorry to say that fully 90 per cent. of the mangoes grown in the State must be classed under the latter heading.

Tropical fruits of all kinds can be set out during suitable weather. Fruit pests of all sorts must be systematically fought.

THE SOUTHERN AND CENTRAL TABLELANDS.

December is a busy month for the growers in the Stanthorpe district. Early apples, plums, peaches, nectarines, &c., will ripen during the month, and must be marketed as soon as ripe, as they do not keep long once they are gathered. Handle carefully, and grade better; there is far too much early rubbish slumped on to the local markets, which tends to spoil the demand as well as the price. Watch the orchards very carefully for Codling moth and fruit fly, and take every possible precaution to keep these pests in check should they make their appearance, as the future cleanliness of the orchard depends very largely on the care that is taken now to keep these pests in check.

If the month is dry, keep the orchard and vineyard well cultivated. Watch the vines carefully so as to detect the first signs of Oidium or Anthracnose, and systematically fight these pests, remembering always that in their case prevention is better than cure, and that only prompt action is of the slightest value.

On the Darling Downs every care must be taken to keep the fruit-fly in check, and on no account must infested fruit be allowed to lie about under the trees, as this is far and away the best method of propagating the pest wholesale.

In the Central District the grape crop will ripen during the month. Handle the fruit carefully. Cut it when dry, and where it has to be sent long distances to market pack in 6-lb. baskets rather than in larger cases. Where dry keep the orchard and vineyard well cultivated, and where the citrus and other fruit trees require it give them an irrigation. Don't irrigate grapes once the seeds have been formed, as it tends to deteriorate the quality, and to make the fruit tender and consequently to carry badly.

From the
Department of Agriculture and Stock,
Queensland.

Frontispiece.

QUEENSLAND AGRICULTURAL JOURNAL

VOL. VI. DECEMBER, 1916. PART 6.

"THE QUEENSLAND AGRICULTURAL JOURNAL."

Up to the present this Journal has been issued on the first day of each month. This date of issue has been found of late to be inconvenient, as it was not possible to publish the latest up-to-date agricultural returns, markets, &c., for the previous month. More especially is this the case with returns from the Queensland Agricultural College connected with the egg-laying competitions, milking results for the month, sales of stock, &c. In order, therefore, to enable us to bring them and similar returns up to the date of publication, it has been decided to issue the Journal on the 10th of each month instead as heretofore on the 1st of the month. A further advantage will be that, whereas often articles of immediate public interest have had to be held over for publication, this delay will be obviated.

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THE "LUCE" CANE-HARVESTING MACHINE.

It will be remembered by readers of this Journal who are interested in the sugar industry that we published an article in the issue of the Journal for March, 1914, and a further notice in June of the same year, on the successful invention of a cane-harvesting machine by Mr. George D. Luce, of Louisiana. Since that year Mr. Luce has so perfected the machine that it performs the work in a manner which appears to be absolute perfection. The machine of 1914 was shown at work at Andubon Park, Louisiana, on a field of 30 acres of cane; and those planters who saw it at work were astonished at its performances, and pronounced it a complete success. That machine weighed about 3½ tons. The new machine and its performance are described in the following article which we take from the "Queensland Sugar Journal" of 7th September:—

Readers of "The Australian Sugar Journal" are already familiar with the experimental work which Mr. Luce, of Louisiana, has been carrying on during the past fourteen years in connection with the development and manufacture of a self-contained harvester that will strip, top, and load cane on the field. It is gratifying to know that at last (according to recognised authorities) he has established, beyond a doubt, the efficiency of the final machine which he has now put on the market as a standard commercial outfit. There is only one qualification attendant on the use of this apparatus, and that is that it must be used only in "machine cane." By "machine cane" is simply meant cane that is grown in rows and is reasonably straight. The rows must be far enough apart to allow of the passage of the machine—say about 4 ft. 6 in. to 5 ft. "Reasonably straight" cane eliminates cane that has been forced flat on the ground; but even this condition is easily surmounted when an auxiliary crew, as explained further on, is used.

Cane that is over on the ground will, naturally, be missed by the pick-ups, which operate a few inches above the surface; but ordinary wind-blown crooked cane and the average leaning cane (crooked or otherwise) are brought into the machine in an upright position by these pick-ups. Very crooked cane and extremely short suckers will need the attention of the auxiliary crew in the manner explained later.

Another important consideration in handling cane with this machine is the condition of the ground over which the harvester has to be worked. Special bottom cutters just skim the surface where the cane is ridged up; so it follows that the surface of the ground should be free from stones and stumps, since these will effectively obstruct the bottom cutting discs.

These are the simple conditions called for under the heading of "machine cane," and where they are found the "Luce" harvester, it is claimed, will harvest cane ready for the mill at the extremely low figure of from 7d. to 10d. per ton. These figures are based on Louisiana conditions; but investigations have shown that about 80 per cent. of the Queensland cane is "machine cane," and that the conditions are very similar to those obtaining in Louisiana.

The following table of operating costs is compiled from data covering a period of two years, and, while subject to modification, may be accepted as a close average.

The cost of labour in Queensland will, no doubt, alter these figures to some extent; but these can be easily calculated according to the rates of pay in the various sugar centres of Queensland. The efficiency of the operating crew, the condition of the ground worked over, the condition of the cane, and the tonnage per acre would all affect the results, so the costs must necessarily fluctuate:—

COST PER DAY'S OPERATION.

	£	s.	d.
Operating crew, 2 men	2	3	0
Fuel	1	1	0
Oil and grease	0	6	8
Interest, depreciation, and repairs	1	0	6
Auxiliary crew, 5 men	1	0	6
	£5	11	8

Seven acres per day is a fair average; so that the cost per acre harvested would only work out at 16s.; and, allowing 20 tons of cane per acre, this would put the cost per ton of cane harvested at 9½d.

As has been mentioned before, these are Louisiana figures; but the only additional cost here, as far as can be seen, would be in the price of labour; but, allowing for double the cost of labour, as shown in the above figures, the cost per ton harvested would not exceed 13d. to 14d. per ton.

We have mentioned an auxiliary crew of 5 men. The function of these men is to follow the machine, and trim those stalks of cane that sneak through without being properly topped and stripped—about 7 per cent. to 10 per cent.—and consisting of extremely short and crooked cane. (With the 1917 model machine the discharge chute has been lengthened and the motor increased in power, so that a dray can be trailed behind the motor and the cane discharged direct into the dray.) Where patches of flat cane are encountered, two members of this crew, one on each side of the row, can easily bring the flat cane up, so that it can be engaged by the pick-ups.

Of the operating crew of two men, one gives his whole attention to guiding the machine through the rows, raising and lowering the bottom cutters as may be necessary; and the other gives his undivided attention to the engine and machinery. The harvester is at all times completely under the control of either of these two men, so that either can instantly stop the machinery.

An important feature of the "Luce" harvester is that it can be used as an all-round-year machine. When the harvesting season is over, the harvesting mechanism can be removed bodily from the tractor, and the latter used for ploughing, hauling, and any general farm purposes. This cuts down the burden of interest and depreciation which each ton of cane harvested would otherwise have to bear. This is an economic feature which will appeal to the progressive planter who is seeking to cut his costs to the last farthing.

Another very important economic feature, apart from all saving of labour and its attendant worries, is the fact that the use of the harvester actually increases the sugar yield by no insignificant amount. The usual cut made by any operator is a diagonal or slanting cut. By the time this stalk gets to the mill, this little lop-sided cone at the end of the stalk is just about dry, and yields little or nothing to the mill Then, there is also the complement of this little cone left in the ground, which must also be considered as a loss.

The machine not only gives a square clean cut, but by so doing, adds the sum of two cones to each stalk, and actually cuts at least 2 in. lower than the most careful hand cutter (who hates to get too close to the ground for fear of dulling his cane knife). The sum total of these apparently insignificant additions to the cane from any acreage is shown in an increase of from 5 per cent. upwards in the sugar yield—an increase that is practically "velvet," and can be had in no other way. It must be borne in mind that this additional piece of stalk delivered by the machine is from the very richest part of the cane—viz., the bottom.

The working weight of the machine is 8½ tons, and this is so distributed on the caterpillar traction system that the machine will operate over very soft ground; in fact, the actual weight per square inch of bearing surface of the creeper is less than that of the average man.

The soil in Cuba is of a loose, loamy description; but absolutely no trouble is experienced on this account.

The photographs shown illustrate the 1916 model machine at work in Cuba, particulars of which are as follow:—

Photo. No. 1.—Luce cane-harvester entering row Colonio "Antonia," near Aguacate, Cuba.

Photo. No. 2.—Operator's side of "Luce" cane-harvester in same cane as Photo. No. 1. Note the mud and trash on the creeper and wheels. These photos. were taken the morning after an all-day tropical rain, when it was too muddy for the oxen or the ox-carts to work; also, the cane was wet and leaves sticky, which conditions, while not good, did not interfere in any way with the operation or quality of cane delivered.

No. 1. PLATE 37.

No. 2. PLATE 38.

Photo. No. 3.—Square-in-front view in "Antonia" cane, showing the badly tangled condition of cane handled. A machine that will harvest this cane "better than by hand" (to use the owner's own opinion) will handle practically any condition of cane grown in rows.

Photo. No. 4.—Close-up view of cane, picked up at random by a native who had no idea of selecting any special sticks.

The Australian agents of this machine—viz., The Queensland Machinery Co., Ltd., 142-156 Albert street, Brisbane—inform us that the Cuban sugar people and the Louisiana sugar people are showing their faith in this machine, inasmuch as the Luce Company Inc. is very busy now on the manufacture of machines for different estates in these countries. In addition to the machines already in hand, the President of the huge Cuban Cane Sugar Corporation has ordered two machines for next season; the President of the Central Rosario Estate has ordered one; and the United Fruit Company and the Cuban-American Sugar Company are also negotiating at the present time for several machines.

No. 3. PLATE 39.

No. 4.

PLATE 40.

PLANTING IMMATURE SEED POTATOES.

The Department of Agriculture in Ireland recommends the planting of whole potatoes, which should be digged before the tops have dried off. It is considered that the dying of the tops is a sign that deterioration has set in, and by digging before this, the seed-tubers are obtained at the time of their greatest vigour. These immature tubers are sprouted before planting, which, it is claimed, increases the yield by 25 per cent., and the crop matures earlier, and can be digged earlier. Sprouting also enables planting to be done when weather and soil conditions are most favourable, as the seed can be kept out of the ground, if necessary, for a week or two without detriment or loss of time. With sprouted seed there are fewer misses and less trouble from weeds, as the strong foliage chokes or checks weeds. Not more than two sprouts, and from the rose end, are allowed to remain. All experiments in this State have confirmed the value of immature seed (says the "Australasian").

MARKET GARDENING.

TOMATOES.

The tomato figures largely in our local markets, and also in our exports to the Southern States; hence, any experiments with new varieties will be welcomed by market gardeners in this State. Mr. W. McLean, of Spring Vale, Boggabri, New South Wales, has been experimenting with certain varieties, about which we have received the following interesting notes:—

Logan's Giant is an extra large tomato, and ripens early—a scarlet colour. It grows on a very strong vine.

Beefsteak is another large variety, as large as Ponderosa, and differing from it only in the colour, which is a brilliant crimson scarlet. This is a late variety, and very suitable for market, as it comes in when many varieties are going off.

New Hummer is a globe variety, and a strong grower. The fruits are quite round and large; a good variety for market.

New Early John Bear is the result of fifteen generations of improvement and selection for earliness, quality, shape, flavour, colour, and shipping quality. Tomato-growers should give this tomato a trial.

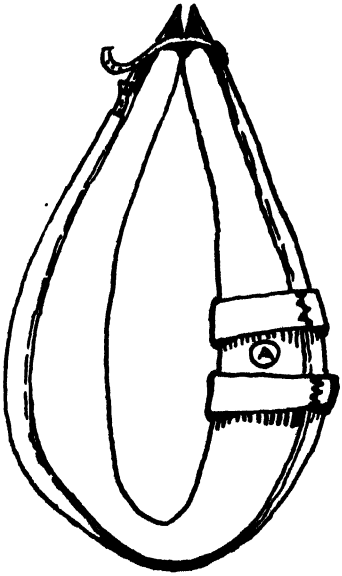
The Horse.

SORE SHOULDERS IN A HORSE.

Mr. J. F. Keane, Carbeen, Mareeba, writes:—

As soon as a "touch" is noticed, cut two strips of gunny bag 3 in. wide, and wrap them two or three times round the collar in the form of bandages—one above and one below the bruise. Fasten them by doubling the end in and stitching as shown.

A.—Place in the collar which has caused the bruise. The packing-needle may be allowed to take up the leather beneath, for one or two stitches. This keeps the bandage in place while the collar is lying about. When in use, tighten the bandage to prevent it slipping. In three days the slight swelling and tenderness of that premonitor to a sore shoulder, known as a "touch," will have entirely disappeared, without any loss of hair. Then the bandages should be taken off. Before doing so, give the collar between the bandages a good hammering with the bottom of a soda-water bottle. This collar bandage trick may also be used to relieve established sores, often leading, with the help of a little cleanliness and a drop of carbolic oil, to their healing while in work.



Viticulture.

THE WINE INDUSTRY.

BY G. A. GATTINO.

PROPER BUILDINGS AND CELLARS.

The Wine Industry is one of the least expensive to carry on, so far as requirements are concerned.

While other industries, to be made profitable, require heavy capital and must be developed on a large scale before profits can be realised, the Wine Industry can be carried on by the small grower as easily as by the big grower, and the same applies to the small wealthy speculator who does not grow, but who wishes to manipulate or manufacture wine by buying the grapes from the grower. For this reason you find that any room or shed is used for making wine. Often the same place is the store for maize, vegetables, cheese, &c.; and quite frequently you may find the cask of wine near to a horse manger or cow stall. Such environment is absolutely detrimental to good wine.

It is certain that all growers cannot afford to provide conveniences for wine, and the consequence is that poor wine is often the result.

Many growers use the same room for pressing, clearing, fermenting, and storing the wine; but while the small grower may do so the real winemaker, who desires to have a standard of excellence, must provide suitable buildings. These will meet all the required conditions for making wine successfully, and give adequate accommodation for perfect and quick work, thereby saving time and labour.

It is needful, therefore, to describe the necessary rooms without using technical terms, so that it may be plain to even the small grower who can possibly take advantage and secure a better result.

To properly make wine, the requirements are—

(1) A place to class and press the grapes and ferment the must. This we will call the *Wine Press or Fermenting Shed.*

(2) A place for maturing the wine, which is the *Cellar.*

(3) Another called the *Store* for the conservation, packing, or holding of the matured wine.

Generally the *wine press* or *fermenting shed* and the *cellar* are in one room, which is a big mistake; the conditions of these two places really being quite different.

The temperature that a must requires during the period of tumultuous fermentation is different from the temperature of a wine in course of maturing; and, again, if in the cellars some wine remains of previous vintages, as soon as the new must is in tumultuous fermentation, the old wine runs the risk of changing and becoming bad.

The winepress shed has to be situated on ground level, and the floor should be 12 to 16 ft. above the cellar floor.

This shed should be provided with openings towards the south, and properly placed to allow of sufficient light to enable work to proceed without need of lamps.

A properly located building will keep during the harvest season a mild atmosphere, which is wanted for good fermentation of the must—that is to say, the interior will have a temperature varying from 30 to 65 degrees, which is necessary for the tumultuous fermentation to develop in a regular and complete way. With a higher temperature, the fermentation would become too rapid; and with a lower, too slow.

In the fermentation shed there must be no lack of air currents, otherwise the carbonic acid gas developing from the fermentation, being heavier than the air, would stagnate in the room to the detriment and risk of life to the persons working.

This shed should be large enough to contain all vats for the must, with plenty of room to operate easily and sufficient space to select the grapes and to place the machines for raking, crushing, and pressing the grapes; large wood or cement vats to work the same; cases, baskets, &c.; and a large entrance door to allow carts to unload the grapes right inside.

It is, however, better to have the crushing of grapes separate from the fermenting of must, which would give shelter to the working man from untimely atmospherical changes of weather and would give more working accommodation.

By building the floor of the crushing shed at a higher level than the fermenting shed, the must, by a system of pipe connections, would run into the vats, where it will ferment.

The floor of the crushing and of the fermenting shed should be of cement, as well as the walls, for about 4 or 5 ft. at the sides, so that in case of emergency, the floor could be utilised to store the surplus grapes; and by giving the floor a natural drain slope towards a small cemented sub-well, no juice would be lost or wasted.

In next month's issue I will write about the cellar, which is the most interesting room in the matter of enology.

The Orchard.

NOTES IN CONNECTION WITH A CONFERENCE OF FRUITGROWERS, HELD AT THE LAND COURT ROOM, EXECUTIVE BUILDINGS, BRISBANE, ON WEDNESDAY AND THURSDAY, 18TH AND 19TH OCTOBER, 1916.

The Conference was opened at 10 a.m. on Wednesday, 18th October, 1916, by Hon. Wm. Lennon, Minister for Agriculture, who welcomed the delegates and expressed the wish that the Conference might arrive at some thorough scheme of co-operation.

Those present included delegates from the following Associations:—

- Ballandean—W. H. C. Laird.
- Beaudesert—A. H. Balmer.
- Beerwah—G. F. Nicklin.
- Bli Bli—F. Pashen.
- Bowen—Jas. Maltby.
- Brighton—A. J. Buchanan.
- Buderim Mountain—Jas. Lindsay.
- Burrum—N. Richards.
- Caboolture—C. R. Warwick.
- Cleveland— ——. Hugonin.
- Cooloolabin—T. Ivens.
- Cooroy—G. G. Dennis.
- Glass House Mountains—F. Gowen.
- Grantham—A. Philp.
- Gympie—Z. D. S. Skyring.
- Howard and Burrum—T. I. Reaney
- Ipswich Horticultural—A. Butchart
- Landsborough—W. Ellison.
- Mapleton—W. J. Smith.
- Maroochy—G. T. Whitaker.
- Montville—A. Bowser.
- Mount Gravatt—J. Flynn.
- Nambour—G. Pitman.
- Perwillowen—W. W. Mallet.
- Queensland Acclimatisation—L. G. Corrie.
- Queensland Farmers' Union:
  - Buderim Mountain Branch—H. V. Fielding.
  - Highlands Branch—A. Holton.
  - Mooloolah Branch—W. J. Redfern.
  - Palmwoods Branch—S. J. Hobson
  - Woombye Branch—J. Howe.
  - Eumundi Branch—G. Gridley.
  - Cooroy Branch— ——. Walker.
  - Cooran (District Lilley Council)—J. Turnbull.
  - Maroochy Branch—W. H. Burton.
  - Didillibah Branch—J. Gosden.
  - Esk and Toogoolawah Branch—G. H. Graham.
  - Glass House Mountains—C. R. Wilson.
- Queensland Horticultural—E. W. Bick.
- Queensland Affiliated Societies—F. Woodroffe.
- Queensland National—J. Macdonald and J. Bain (secretary).
- Queensland Fruitgrowers' Industrial Trading Society:
  - Brisbane—C. Rose.
  - Brisbane—J. Rose.
  - Howard—E. J. Stafford.
  - Tinana—F. Copley.
- Queensland Nurserymen—T. H. Wood, John Williams, and W. Soutter.
- Redland Bay—H. J. Moore.
- Rochedale—A. C. Woods.

Rosemount—A. P. Myers.
Rockhampton—F. W. de Little.
Roma Street Market—H. Stanton.
Stanthorpe—H. E. Lyons.
Sunnybank—D. M. Henderson.
Terror's Creek—D. F. Stewart.
Turbot Street Market—A. E. Chave.
Victoria Point—D. N. Colbourn, junr.
Wellington Point—J. W. Dunlop.
Woombye—E. H. Davies and J. T. Wilson.
Wynnum—H. Randall.
Zillmere—J. Mackie and F. M. Ruskin.
Coolum—F. O. Venning.
Cooroy—H. I. H. Ross.
Logan—I. Dennis.

Upon the Conference being opened by the Minister, Mr. Philp proposed a vote of thanks to Mr. Lennon for acceding to the request for a Conference being called. Mr. Maltby seconded the motion, which was carried with acclamation.

Mr. Lennon thanked those present, but pointed out that he must give credit where it was due; and he considered the credit of getting the Conference together was due to Mr. Benson. He also stated his pleasure at the number that had responded to the invitation.

Mr. Benson then delivered his Chairman's Address, which was prefaced by a few remarks as to the necessity for such a Conference being called, and asked those present to put their best brains, thoughts, and abilities into making the Conference a successful one not only for individuals but for every fruitgrower in the State:—

THE NECESSITY FOR COMBINED ACTION BY FRUITGROWERS, IN THE HANDLING, MARKETING, DISTRIBUTION, AND UTILISATION OF FRUIT AND VEGETABLES.

Being firmly convinced that the Fruit Industry of Queensland is rapidly approaching a stage when our presently existing markets will be unable to deal effectively with the produce of our Orchards and Plantations, I have decided to bring the question of organisation prominently before you at this Conference, as I am certain that the future success of the Fruitgrowing Industry of this State depends very largely on the manner in which it is handled commercially.

In my opinion, the time has now arrived when producers should realise that the period of individual effort has passed, and the advent of combined and organised enterprise is the only possible means of profitably disposing of their produce.

During recent years the demand for fruit has frequently been in excess of the supply, with the result that very satisfactory prices have often been obtained and the necessity for organised effort has not made itself felt very keenly. There have, however, been periodical gluts of various kinds of fruit, and during such periods there have been spasmodic outcries, pointing out the necessity for organised effort and the advantages to be derived by co-operation, which die out as soon as normal conditions prevail; and no definite action to prevent or even minimise the loss caused by such gluts has been taken or is apparently likely to be taken by fruitgrowers under existing conditions. Present conditions are, however, likely to become materially altered in the no very distant future, as the satisfactory prices that have been obtained for fruit and the profits that have been made by many fruitgrowers have induced a very considerable number of people to take up fruitgrowing, with the result that there has been a big increase in the demand for orchard lands both in the older-established as well as in new districts, and the area devoted to the growing of all kinds of fruits is rapidly increasing; and this increase in area naturally means an increase in production, particularly under the more favourable weather conditions we are experiencing.

If, therefore, we have experienced glutted markets in the past, it is only natural to expect that with an increased production such gluts will recur and become intensified unless steps are taken to prevent this undesirable condition being brought about. Even at the present time, although the fruitgrowers in the Southern part of the State have little to complain about in the matter of the prices realised for their fruit, our Northern growers are far less favourably situated, and many fine orchards are being abandoned in Northern Queensland owing to the inability of their owners to obtain a remunerative return for their fruit. I have recently received a number of detailed reports from Mr. S. C. Voller, who has been acting temporarily as Instructor in Fruit Culture in the North; and his account of the condition of the orchards and of the despair of their owners, owing to lack of markets and marketing facilities, is nothing short of pitiable. Many growers have either lost heart entirely or have become so despondent that, unless there is a decided improvement in the conditions now existing, fruitgrowing as an industry will be abandoned from Bowen to Cooktown, and the land devoted to fruitgrowing will return to a state of Nature, which, in many instances, it is already doing. This is a very serious matter indeed, and one that, in my opinion, deserves the most careful consideration; and anything which can be done to place the industry on a more satisfactory basis will not only be of benefit to individual growers but to the State as a whole, as we cannot afford to neglect any industry in the North that will yield a remunerative return to the owner for the time and labour expended on it. The question, therefore, arises here: Can the conditions governing the fruitgrowing industry of this State be improved? and this can only be answered by carefully considering our present methods and determining in what respects they are deficient.

In the first place, let us consider the orchards themselves, and see whether they can be improved, as we must grow the fruit before we have it to sell. Then what sells best and is most easily disposed of—good fruit or bad? Every grower and every dealer will, I am sure, say good fruit, and that he has no difficulty to dispose of first-class lines even in a full market. Therefore, why grow bad? By bad I do not necessarily mean small or second-grade fruit, but poor varieties that are either deficient in flavour, appearance, keeping, or carrying qualities, and which must in consequence be disposed of as quickly as possible or become unsaleable. Why grow such varieties when good fruit can be grown? The first step must, therefore, be taken in the orchard—get rid of inferior fruits and fruit trees which are not profitable, frequently spoil the market for good fruit, and are breeding-grounds for all kinds of pests. Get rid of the bulk of the rubbish that is often the cause of glutted markets, and you will have fewer gluts and better prices for first-class fruits.

In the second place, let us consider how the growers handle their fruit, and whether any improvement can be brought about in this direction. Well, I think there is room for improvement. How many growers grade and pack their fruit as it should be? And how many brands of Australian fruit compare favourably in appearance and general get-up with the Oregon or Californian apples now on this market or with the citrus fruits of California or Italy? Why, then, do imported fruits always realise high prices? Simply because the buyers can depend on what they are purchasing and are prepared to pay high prices in consequence, much higher than they will give for locally grown fruit, as they know that in the majority of cases they cannot depend on the grade or pack. Good fruit, well graded and well packed, will sell in a glutted market when the same fruit if offered for sale in an unattractive manner cannot be disposed of. Many growers have, therefore, a good deal yet to learn respecting the handling of their fruit, and there is plenty of room for improvement. Every good business man who has goods to dispose of knows that the secret of success is to display such goods in the most attractive form, as the better the goods are displayed the greater the chance of their meeting with a ready and satisfactory sale. This being so, why will growers of fruit still persist in marketing their produce carelessly, and neglect to place it before the buyers in the most attractive form?

These two considerations—the growing of only good fruit, and the placing of it on the market in the best possible condition—are in the hands of individual growers to a very large extent, as they are matters which come under their immediate control; but there are many other matters connected with the sale of fruit which they are unable to deal with single-handed, and which can only be dealt with by organised effort.

I refer to such matters as—

The handling and carriage of fruit by our railways and coastal steamers.

Regulating the supply of fruit to the various markets so that no one market shall be over-supplied whilst others are under-supplied.

Forwarding fruit direct to provincial markets instead of concentrating the whole of it in the capital cities.

Encouraging the consumption of fruit.

Improving the means of distributing fruit so that it shall be obtainable by consumers throughout the Commonwealth at reasonable rates.

Opening up new markets.

Utilising surplus fruits.

These are matters that can only be dealt with effectively by organised effort, as are many others that will be dealt with later on. The question, therefore, arises here: Are fruitgrowers to bring about the necessary organisation which will be powerful enough to carry out the necessary reforms? and this is the question I wish every member of this Conference to seriously consider, as the success of such an organisation will depend very largely on the right steps being taken at its initiation.

In order to place the matter as concisely as possible before you, I wish to point out that, in my opinion, the only possible chance of establishing such an organisation on a sound commercial basis, without which it has not the slightest chance of success, is the formation of a powerful fruitgrowers' union, in which every commercial fruitgrower in the State is financially interested, and whose rules and regulations he binds himself to comply with implicitly. No half measures will suffice: The union must be a cast-iron one, and every member must be loyal to it. This is the only royal road to success in co-operative effort; and the failures of hundreds of so-called co-operative enterprises are due to the fact that the bond of union is not sufficiently strong and members are not loyal to their association, and thus bring about the defeat of the very objects for which the association has been established. This is the experience of all great co-operative enterprises, and it has only been by the enforcement of the statute regulations compelling every member of the co-operative body to be absolutely loyal to his association that success has been attained. There is an old saying that "Union is strength"; but there is also another, and that is "That the strength of a chain is that of its weakest link." This simile is especially applicable to co-operation, as if there is one weak link, such as the disloyalty of individual members, the whole undertaking ends in failure; and to guard against this weak link it is essential that every member must be so bound to his association, financially and otherwise, that he is unable to break away, and realises that his only chance of success is to be absolutely loyal.

This may seem hard to many. as it means giving up one's own right to do as one wishes and working for one common cause, for the benefit of one's fellow fruitgrowers and incidentally for oneself, as it is impossible to benefit the association without benefiting every member thereof.

A union such as I have outlined should be controlled by one Central Executive with branches in every fruitgrowing centre who are in constant and direct touch with the Central Executive, the members of which are appointed by the district branches. The Central Executive should have at its head a keen business man of wide experience and undoubted ability, as the success of the undertaking will depend very largely on the executive head. His position should be a permanent one, and it should be his duty to keep in touch with all markets and with every phase of the fruit industry as well as with the secretaries of every branch.

Then, secretaries must have a good general business knowledge, and must keep in direct touch with every member of their branch so that they are in a position to advise the official head of the Central Executive of all local requirements and of all matters of interest to the members of their branch. Every member of every branch must keep in direct touch with the secretary of his branch, who will deal with all purely local matters, but who must submit all matters of importance at once to the executive head.

The union would deal with all matters relating to the carriage of fruit, its distribution and sale, and would relieve growers of the whole of the trouble of marketing and disposing of their fruit; and at the same time it would act as a purchasing agent for all goods required by growers for the successful carrying out of their business. In brief, the union undertakes the management of the commercial side of fruitgrowing, both as regards the disposal of the produce and supplpying the requirements of growers, and leaves the grower to devote the whole of his time and energy to producing good fruit and putting it up for sale in the best possible manner.

Such a union would speak with no uncertain voice, and would command attention when such matters as providing better accommodation for fruit on shipboard are being considered, as it would speak not for a small section of the growers but for the whole of the growers of the State, and it would have the weight of every one of its members at its back. This is true co-operation—a true binding together of all fruitgrowers for the production of their mutual interests; and if it can be brought about, as I trust it will be, it will do much to secure the further prosperity of the Fruit Industry of this State.

In conclusion, I trust that these remarks, which I have endeavoured to place before you in as concise a form as possible, will promote a good discussion, and that they will result in this Conference agreeing to initiate a scheme which will result in the formation of a Fruitgrowers' Union for the protection and advancement of the Fruitgrowing Industry of this State.

At this stage it was decided to limit speeches to five minutes, such time to be extended through the Chairman, if necessary.

On the motion of Mr. Mallet, seconded by Mr. Bardsley, it was unanimously decided that "the time is now opportune for organisation of the industry."

Mr. J. T. Wilson referred to the difficulty experienced by growers in obtaining a fair price for their produce commensurate with the cost of production. He considered the time was now opportune for the formation of a co-operative society having its headquarters in the capital, with branches in the larger centres and agencies in the different towns where there are markets, either in the Commonwealth or oversea. He thought that the Conference should appoint a sub-committee to draw up a prospectus, which should be submitted to the Conference at a later session. He then moved to that effect; and Mr. Howes seconded the motion.

Mr. W. H. Burton moved, as an amendment, "That measures be taken for the amalgamation of the Farmers' Co-operative Distributing Company and the Queensland Fruitgrowers' Industrial Trading Society." Mr. J. Turnbull seconded the amendment.

Mr. A. Philp moved, as a further amendment, "That a committee be formed from this Conference to meet the directors of the Queensland Fruitgrowers' Industrial Trading Society to try and broaden the scope of the society's work." Mr. Copley seconded the further amendment. Mr. Redfern supported this amendment. Messrs. Philp, Copley, and Redfern referred to the number of years the society had been in existence, and the work it had done.

Mr. Bardsley considered it was rather early for the establishment of such a committee.

Mr. Stafford supported Mr. Philp's amendment. He stated that the society had been in existence for some time, and was one of the soundest bodies in Australia. They had paid agents in Melbourne and Sydney, and an office in Brisbane. He considered if a large number of growers went into the society they would put it in the place it ought to be; then the different districts could be reached by agents. The machinery was there.

Mr. J. T. Wilson did not consider the growers in the Woombye district would be in favour of joining the trading society. One delegate had referred to the machinery being there, but he (Mr. Wilson) thought that, if machinery was obsolete, the best thing was to scrap it and get new machinery. The market, he considered, wanted putting on a sound commercial basis so as to prevent gluts, &c., and the way to do it was to start out on new lines.

Mr. Henderson considered that the system of selling the fruit by auction did not give growers much benefit.

Mr. Pitman agreed with Mr. Wilson to some extent, and stated that he had looked on the trading society as practically forwarding agents. He thought that a man should be able to consign his fruit to the head centre, and, if it was a reliable pack, the centre could stamp it and send it anywhere. Unreliable packs could be gone over and the necessary charge made on the grower for repacking.

Mr. Burton considered that the main trouble was lack of system of distribution.

Mr. J. P. Moran considered that co-operation was the best thing for all the growers present. He also referred to the necessity of obtaining the loyalty of all the growers to the society if formed.

Mr. Nicklin thought a new company should be formed and a fresh start made.

Mr. Venning was of the same opinion.

Mr. Randall urged the necessity of proper distribution.

Mr. Bardsley referred to the necessity of getting quickly to the consumer, and considered it would be wise to have one good society made up of good machinery of the existing societies.

Mr. C. Rose considered the trading society had done an immense amount of good, especially in the way of markets, and he thought the amalgamation of the existing co-operative bodies in the State, and other persons in the different districts, who were at present outside the society, would solve the problem.

The Chairman, in order to obtain finality, advised the formation of a committee, and asked the Conference whether they did not think it better to take advantage of the experience of these men and discuss the matter with them in committee?

Mr. Philp's amendment on the amendment was put, and lost.

Mr. Burton's amendment for the amalgamation of the F.C.D. Company and the Q.F.I.T. Society was then put, and lost.

The motion—"That a committee be formed from this Conference, consisting of men representing the various fruit interests, to formulate a scheme for the formation of a co-operative society, to report progress to the Conference"—was then put, and carried.

Mr. Skyring moved, and Mr. Mallet seconded, a motion that the appointing of this committee be left to the Chairman.

The motion was put, and carried; and the following were selected by Mr., Benson:—

Messrs. Laird, Maltby, Pitman, Bowser, Copley, Nicklin, Randall, J. Dennis, J. T. Wilson, and Lyons;

while Mr. Benson acted as chairman to the committee.

Scope of the Work to be Undertaken by the Organisation.

Mr. Hugonin appealed to those present to work together in the interests of the fruitgrowers generally, and not let little private interests creep in.

Mr. J. T. Wilson proposed—"That this proposed organisation take upon itself the entire control of the marketing, utilisation, and disposal of fruit in Queensland, and appoint a manager and executive to carry on the business."

Mr. G. G. Dennis seconded the motion.

Messrs. Copley, Stafford, and Philp considered it was not the time to bring forward such a motion.

Mr. Mallet deprecated the introduction of outside matters, and thought the scope of the Conference would be to advise some means for putting good fruit into the hands of the consumer as cheaply as it would pay to produce it. He also referred to the necessity for the introduction of canning in connection with the pineapple and other branches of the industry. He considered the pineapple industry depended almost entirely on canning.

Mr. Pitman considered that those appointed to the committee and the representatives of the societies should sit back and take the suggestions from the other delegates.

Mr. Voller was then called upon by the Chairman to give the Conference an outline of his experiences in the North, and he explained the difficulties the growers there had to contend with in the way of lack of shipping facilities, indifferent handling of their produce, and the difficulty of obtaining markets.

Mr. Gridley asked whether there were as many bananas grown in Queensland to-day as there were five years ago; and the Chairman informed him that, owing to the failure of the Northern trade, the production had decreased materially.

Mr. Wood considered the Government, as well as giving instruction in the growing of the fruit, should teach the preserving of it, or find markets. He referred to banana flour as an industry that should be tried, and for which there would be a ready market. Jamaica was instanced as an example.

The Chairman thought that matter could be dealt with by the organisation, including also the manufacture of banana figs. It would mean the establishment of a big drying-house, properly equipped, and right up to date. The Department dealt with the question of banana flour some years since, but were not successful in finding a profitable market. He emphasised the necessity for utilising the surplus of the various fruits, and considered the suggestion a good one.

The Chairman also endorsed Mr. Voller's remarks regarding the state of the industry in the North.

Mr. Laird explained the difficulties of the Stanthorpe growers. They were increasing their crop of stone fruits to such an extent that, if some alteration in the present system were not arrived at, they would hardly know what to do with their fruit. He thought the distribution and carrying should go hand in hand, and referred to the necessity for advertising.

Mr. Gridley referred to the probable advantage to be derived from extending the markets in South Australia and Western Australia.

Mr. Bardsley considered that production should be controlled. He considered there must be a normal demand.

Mr. Philp considered it was not over-production, but simply a matter of distribution.

Mr. Ivens pointed out the necessity for better distribution, as many markets were available that were not yet exploited. He also recommended the more general use of fruit as an every-day article of diet, and urged the need for a cannery.

Mr. Stanton endorsed the remarks of the previous speakers, especially with regard to distribution. He pointed out the necessity of the Northern growers taking greater care in the handling and packing of their fruit, as much of it arrived in Brisbane in a condition necessitating its picking over, thus entailing heavy losses to the shippers. He did not like the country-order trade, which he considered dangerous from the merchant's point of view.

Mr. Laird wanted to know what would happen if the Fruitgrowers' Co-operative Society got control of their own production?

The Chairman informed him that distributors would be necessary, for, although a great number of things could be done without, there must be someone to put it before the consumer. They still have to utilise distributors in California, so we would be under the same necessity here.

Mr. C. R. Wilson endorsed the necessity of better methods of distribution instead of rushing all the fruits to one market. He referred to his experience in receiving, producing, and marketing fruit in New Zealand.

He wanted to do what he could to bring about the organisation of the industry here.

The same speaker pointed out the success achieved by the New Zealand Farmers' Co-operation, which started at Canterbury. The first year the turnover was £14,000, and last year it was £2,500,000, principally lambs; it was worked simply on a commission basis, and at the end of the year bonuses were distributed to suppliers. He considered a man of great ability was required as head of the concern. The New Zealand Farmers' Co-operation, Christchurch, went ahead by leaps and bounds; they paid their manager £2,000 or £3,000 a year. If there were brains and a proper system of distribution, he considered there would be no complaints, not even from the cabbage farmer (who was complaining at present of the glut). He advocated the amalgamation of the existing societies.

Mr. Dunlop emphasised the necessity of the association having sufficient capital to start with, and pointed out the necessity for a binding agreement to compel the producers to be loyal, as lack of loyalty seemed fairly common among farmers' co-operative societies, &c. He did not consider they would make much of a success at what they had in view with less than £100,000 subscribed stock.

The Chairman pointed out that there seemed to be a consensus of opinion regarding the need for improvement in the methods of distribution, but no ideas seemed to have been forthcoming with regard to purchasing. He had heard lately of the enormous differences in the charges for fruit cases, and thought the purchase of nails, manures, spraying plants and materials, and the hundred-and-one odd things needed in the business would help them considerably. He considered purchasing on the right lines was half the business battle.

Mr. Dunlop pointed out that these were the lines some of the largest co-operative concerns in Great Britain had started on. They gathered enough on the purchasing lines to capitalise them on the selling lines. He referred to the country trade as a dangerous one, and considered that one might fall in for more than he would get out of it.

Mr. Howe also referred to the need for better distribution.

Mr. Graham endorsed the necessity for appointing a thoroughly competent business man, and paying him sufficient salary to make him work "up to his top notch."

(Some discussion ensued as to the lowest commission at which the business could be successfully carried out.)

Mr. Ivens wanted to know how the company was going to be financed between the time the fruit was sent down by the farmer and the time it was sent out and sold? He considered many growers could not wait two or three months for their money, and advocated prompt payments for the small men, as otherwise these men would be likely to go to those who would make them prompt advances.

Mr. Moore pointed out the advantage that had accrued in their district with regard to co-operation in case-making, whereby a considerable saving was effected. He considered the trading society had benefited the farmers, but did not consider the farmers, as a body, were loyal to their comrades—they would not pull together.

The Chairman suggested that the delegates might give the sub-committee an idea as to the capital they considered necessary.

Mr. Mallet proposed—"That the capital of the association be not less than £50,000, and the minimum number of shares be five."

The motion was seconded by Mr. Burton as a recommendation to the committee, and was put and carried.

On resuming the business of the Conference after the dinner adjournment, Mr. Benson gave a résumé of the business transacted by the sub-committee; and the Secretary read the recommendations which they submitted for the approval of the Conference.

Mr. Walker inquired whether the Federal tax would not be much higher if the nominal capital were fixed at £100,000 instead of £50,000? He thought the repatriation tax would amount to £1,500.

The Chairman explained the incidence of the repatriation tax and the fact that any goods, stock, seeds, &c., donated to the Fund would entitle the donor to have their value deducted as part payment of his tax.

Mr. C. Wilson considered that the meeting should look ahead before deciding on too small a capital. In ten years' time even £200,000 might not be enough. He considered that many companies, when formed, overlooked the fact of possible expansion, and had to pay for it later.

The Chairman pointed out that this was very expensive.

Mr. C. Wilson drew attention to the fact that one of the large merchants in Brisbane told him the supply of canned pineapples was only sufficient for seven months of the year, and then, when they got fresh supplies, they had to advertise the fact. An auctioneer had also drawn his attention to a London house who would take almost any quantity of pines, but the pines put up must be absolutely the best article brains could produce.

Recommendations from the Sub-committee.

The recommendations from the sub-committee were submitted *seriatim.*

On the motion of Mr. Gridley, seconded by Mr. Mallet, it was decided that the name of the organisation be "The Queensland Co-operative Fruitgrowers' Limited."

On the motion of Mr. Ivens, seconded by Mr. Gridley, it was decided that the capital be £100,000 in £1 shares.

On the motion of Mr. Holton, seconded by Mr. Randall, it was decided that the minimum number of shares to be held by one individual be five.

On the motion of Mr. Holton, seconded by Mr. Mallet, it was decided to make an addition to the recommendation—viz., that no dividend on shares shall exceed 5 per cent. per annum on paid-up capital.

On the motion of Mr. Gowen, seconded by Mr. Graham, it was decided that the objects be—To receive, distribute, and utilise fruits and vegetables; to buy and sell any commodities required by the corporation for the carrying out of their business; and to undertake any business that may be of benefit to the said corporation.

Constitution.

It was decided that "the management of the corporation be vested in the hands of a directorate of nine (9) members, to be elected by the shareholders from their number. That a general manager possessing keen business ability be appointed; and that the staff be appointed by the board of directors and the general manager." This motion was proposed by Mr. Gowen, and seconded by Mr. Graham.

Retirement of Directors.

On the motion of Mr. Mallet, seconded by Mr. Randall, it was decided that the directors retire in rotation, three a year, so that there be a majority of the directors who are conversant with the business, the retiring directors to be eligible for re-election.

Provisional Directors.

It was decided to appoint a board of provisional directors to meet and draft a prospectus and articles of association.

On the motion of Mr. Mallet, seconded by Mr Graham, it was decided that the head office be in Brisbane.

Nominations were then taken for the provisional directors, and the following were elected:—Messrs. James Lindsay, G. F. Nicklin, A. Bowser, G. Pitman, C. R. Wilson, H. Randall, W. W. Mallet, G. H. Graham, W. H. C Laird, and G. G. Dennis.

19TH OCTOBER, 1916.

Control of Fruit and Vegctable Pests.

The Chairman, in his opening remarks, pointed out the necessity for combined action on the part of all growers in the destruction of fruit and vegetable pests, and referred to the disadvantages that the commercial grower of fruit had to contend with owing to the large number of non-commercial growers who only grow fruit trees for home consumption, and take no systematic action regarding the destruction of pests. He further pointed out that hitherto "*The Diseases in Plants Act of* 1896" had only been enforced with respect to the question of imported fruits, plants, and vegetables, as well as locally-grown articles forwarded to the metropolitan markets, but that very little orchard inspection had taken place. Referring to the recent outbreak of beetle borers in a part of the State, he pointed out that such an outbreak could not have occurred to the extent it has, had a system of orchard inspection been in vogue.

A long and general discussion on this pest took place, in which many of the delegates took part. Mr. H. C. Moore, of Redland Bay, who has had considerable experience with this pest, gave his experiences, showing that the mature insects were easily attracted to heaps of old stumps, where they could be gathered up and destroyed. He strongly recommended the use of such traps, and considered that the destruction of all rubbish other than the traps would tend materially to decrease the numbers of this pest. He found that the borers preferred the old stumps to the young growing plants.

Specimens of affected banana plants and of the insect in all stages of its development were submitted for the information of the delegates.

The Chairman referred to the fruit fly and to the fact that a remedy would shortly be placed on the market in Queensland which could be supplied to the growers at a reasonable cost, and would attract every male fruit fly within reach.

The Chairman asked for suggestions with regard to the treatment of diseases; and in the case of the borers suggestions were made that the affected stools should be blown up with dynamite. Gelignite was also mentioned; and Mr. Benson promised to try the use of explosives as suggested.

Mr. Skyring suggested that specimens of the beetle be sent to the school teachers in the banana-growing districts, so that the children might be told about them, as they would be much quicker at discovering the beetles than older people.

The Chairman agreed to ask the Minister to instruct the Entomologist to prepare specimens, to be supplied to schools and associations in banana-growing districts.

The consensus of opinion of the delegates was to the effect that every means should be taken to prevent the spread of the borer into clean areas, and to keep it in check where already established.

On the motion of Mr. Corrie, seconded by Mr. Gowen, it was decided—"That it is necessary to take combined action for the destruction of the fruit pests."

In connection with the best means of destroying fruit pests, Mr. Graham proposed and Mr. Wood seconded a motion—"That this meeting of fruitgrowers urge the Minister for Agriculture to place a sum of money on the Estimates to provide for the appoinment of officers competent to undertake scientific investigation of plant diseases." The motion was carried unanimously.

Enforcement of Diseases in Plants Act.

On the motion of Mr. Mallet, seconded by Mr. Whitaker, it was resolved—"That the Diseases in Plants Act, as amended, be put into force."

The Chairman then read a letter from the Mount Cotton Association protesting against the enforcement of the Act any more than for the past ten years, and asking that the Act be enforced in the forest, if enforced on the farms, as the same pests exist there.

Mr. Hugonin referred to the scarcity of labour, and asked for sympathetic administration of the Act; and the Chairman pointed out clearly that it was not his intention to administer the Act with severity, but it would be administered with common sense.

Mr. Maltby made a request for a cyaniding plant to be sent to Bowen, with a man in charge.

The Chairman gave a dissertation *re* the combating of Irish Blight, and recommended care in the selection of seed, treatment of seed prior to planting, and systematic spraying of the plants. He pointed out that the control of this pest was in the hands of the growers.

Mr. Dunlop endorsed the Chairman's remarks.

On the motion of Mr. Corrie, seconded by Mr. Graham, it was decided—"That this Conference of Queensland Fruitgrowers urge upon the Minister for Agriculture and the Government the necessity for the establishment, in the best interests of the primary producers, of a Faculty of Agriculture at the University of Queensland." Carried without discussion.

On the motion of Mr. Reaney, seconded by Mr. J. Wilson, it was decided—"That a delegation selected from the provisional directors be sent immediately to wait on the shipping companies to bring before them the necessity for providing better accommodation for fruit and vegetables on shipboard, and to improve the present methods of handling."

Rapid Train Service.

The Chairman reported that the Railway Department had this matter in hand.

It was proposed by Mr. Holton, seconded by Mr. Redfern—"That this Conference desires to place upon record its appreciation of the action of the Railway Department in its endeavours to bring about an acceleration in the carriage of perishable products by rail from Queensland to the Southern States, and that it be an instruction to the Chairman to forward this to the Commissioner for Railways."

This motion was put, and carried.

A motion was proposed by Mr. Dunlop, seconded by Mr. Ivens—"That this Conference appoint a delegation from the provisional directors to the Commissioner for Railways asking that the Beaudesert-Kyogle Railway connection to New South Wales be proceeded with as early as possible." After discussion, the motion was put, and lost.

A question being raised *re* Citrus Canker, the Chairman pointed out that every precaution was being taken by the Federal Government to prevent the introduction of this dread pest. Unfortunately, it had made its appearance in the Northern Territory. So far as is known, it has not made its appearance in this State.

With regard to fertilisers, Mr. Elphinstone explained the preparation of ground lime; and, in reply to a question, the Chairman stated that it came under the amended Act, which required that the state of fineness of the ground limestone must be stated at time of sale.

The Opening up of New Markets.

In connection with the opening of new markets, a general discussion ensued; and the Chairman pointed out that he believed it would eventually be found that pineapples carried at the right temperature and under proper conditions could be successfully sent to the home markets, and instanced what was being done in the carriage of fruit from the West Indies and other places.

Mr. Hugonin suggested that a practical test should be made; but the Chairman informed him that the matter would have to stand over till the termination of the war, as it could not be arranged at present.

Mr. C. R. Wilson suggested America as a possibly better market than London; and the Chairman pointed out that this market had been tested some years ago and satisfactory returns obtained, but for some reason the trade had not developed.

Mr. Voller referred to the necessity for advertising our fruits in distant markets.

Mr. Wood pointed out that our tropical fruits were not known commercially on many of the Southern markets.

On the suggestion of Mr. Laird, supported by Mr. Lyons, the Chairman promised to ask the authority of the Minister for carrying out, on their behalf, cold storage experiments with fruits from the Stanthorpe district—grapes, peaches, &c.

The question of marketing peaches in trays from Stanthorpe was discussed; and Mr. Ross, Instructor in Fruit Culture, instanced what had been done in this direction at Westbrook some years ago, and the success that had been attained thereby.

Mr. Bowser moved (on behalf of the Montville Association), and Mr. Ivins seconded, a motion to the effect "That the Hon. the Minister be asked to favourably consider the establishment of demonstration orchards and the carrying out of practical orchard experiments." This motion was carried unanimously.

Mr. Laird proposed—"That this Conference of Fruitgrowers recommend to the Minister for Railways that receptacles be provided in each of the carriages of the Southern Mail Train for the depositing by passengers of waste fruits, and that notices drawing attention to the presence and use of these receptacles be provided." The motion was seconded by Mr. Lyons, and, when put, was carried.

Mr. T. I. Reaney mentioned that he had received word of an Interstate Conference of Fruitgrowers which was to open at Melbourne on the 31st October, 1916.

The question of a delegate was mentioned; and it was decided that Mr. A. Philp, of Grantham, who was already going down to represent the Queensland Fruitgrowers' Industrial Trading Society, should be asked to represent the Conference of Queensland Growers.

Mr. D. Jones drew attention to the report in the papers concerning the possible lowering of the duty on dried fruits, as mentioned by the Chief Commissioner; and, on the motion of Mr. Gowen, seconded by Mr. Maltby, the following resolution was carried:—"That the attention of the Hon. the Minister for Agriculture be drawn to an article that appeared in the 'Daily Mail' of 19th October, to the effect that it is proposed to lower the duty on imported dried fruits. This Conference feels that such action would be detrimental to the best interests of the fruitgrowers of this State, and trusts that the Hon. the Minister will place our views before the Federal Authorities."

On the motion of Mr. Laird, seconded by Mr. Bardsley, it was decided to convey a similar resolution to the Interstate Conference.

The Conference closed with a hearty vote of thanks to Mr. Benson and the officers of the Agricultural Department.

NEW FRUIT-PRESERVING PROCESS.

The tests of a new process of preservation of fruit, in conjunction with refrigeration, known as the Kapadia system, have been concluded with (it is stated) very favourable results. The Commonwealth Government Office in London had placed in Dr. Kapadia's chamber some cases of Australian apples, very mixed specimens, some of them bearing bruises. After six and a-half weeks' storage under the Kapadia system (following, of course, the six weeks or so of refrigeration since packing in Australia), the fruit, on being taken out of the chamber, was found to be in precisely the same condition as it was when put in, the bruises on the apples revealing no vestige of extension. A box of West Australian apples affected by latent "bitter pit" under the skin of the apple had had this affection checked. The Kapadia process consists in substituting for the ordinary air of a cold storage chamber an inert gas, the simple product of combustion in a surface combustion boiler. Another apple disease, "black spot," was also found to have been arrested, and the apples actually bore the original orchard bloom, and appeared in perfectly first-class condition. Carriage under the Kapadia system is said to need only a temperature of about 50 degrees Fahr., instead of the freezing or chilling temperature of ordinary cold storage, so that the experiments are stated to point to favourable development and exploitation of the process. The trials are to be followed by tests with soft fruit.—"Farmers' Gazette."

Botany.

ILLUSTRATED NOTES ON THE WEEDS OF QUEENSLAND.

BY J. F. BAILEY, Government Botanist, AND C. T. WHITE, Assistant Government Botanist.

No. 6.

CAPE SPINACH.

EMEX AUSTRALIS, Steinh.

During the past month numerous specimens have been received of *Emex australis*, the Cape Spinach, for determination and report, and the plant seems to be spreading to some considerable degree. It is a native of South Africa and is recorded by Bentham in the "Flora Australiensis" with some doubt as indigenous to South and Western Australia, but has now spread into all the eastern States. F. Turner, writing in the "Sydney Morning Herald" of 7th December, 1912, says: "In 1830 the ship 'Margaret' left Bristol, England, with passengers for the Swan River Settlement, West Australia, and during the voyage called at Capetown, South Africa, where one of the intending settlers procured some seeds of the so-called Cape Spinach, a plant known to botanists as *Emex australis*, with the view of cultivating it in the land of his adoption. In due course the seeds were sown in a garden in Western Australia, and the resulting plants grew vigorously; but, instead of being a useful and palatable vegetable, it has proved to be one of the most obnoxious and aggressive weed pests ever acclimatised in Australia."

It was first recorded for Queensland as naturalised about St. George in 1911 ("Queensland Agricultural Journal," Vol. 27, p. 305).

It is a glabrous annual of spreading habit, with rather fleshy prostrate or ascending stems; the leaves are long-stalked, broadly ovate, truncate at the base and wavy on the edges. The flowers are unisexual, the males in a short raceme rising from the cluster of subsessile female ones. The fruiting perianth is enlarged and hard, with a triangular tube and three outer rigid spreading spines near the top and three inner shorter ones closing over the fruit. The worst feature about the plant is its spiny seed-vessel, for as it lies on the ground one of the three sharp spines is always erect, or nearly so, and therefore likely to cause painful wounds; and, further, as the plant is spreading in sheep areas, wherever seen, its eradication should be proceeded with immediately.

It has numerous vernacular names, among them being Spiny Emex, Goat-head Burr, Three-cornered Jack, Cats' Heads, Cape Dubbeltje-Doorn or Cape Devil's Thorn, &c.

Mr. Andrew Smith, in his work on the medicinal plants of the Cape Colony, says: "The leaves are boiled and used as a cabbage in biliousness and also for creating an appetite; they are mildly purgative and diuretic."

Eradication, as in the case of all annuals, should be proceeded with prior to the seeding stage.

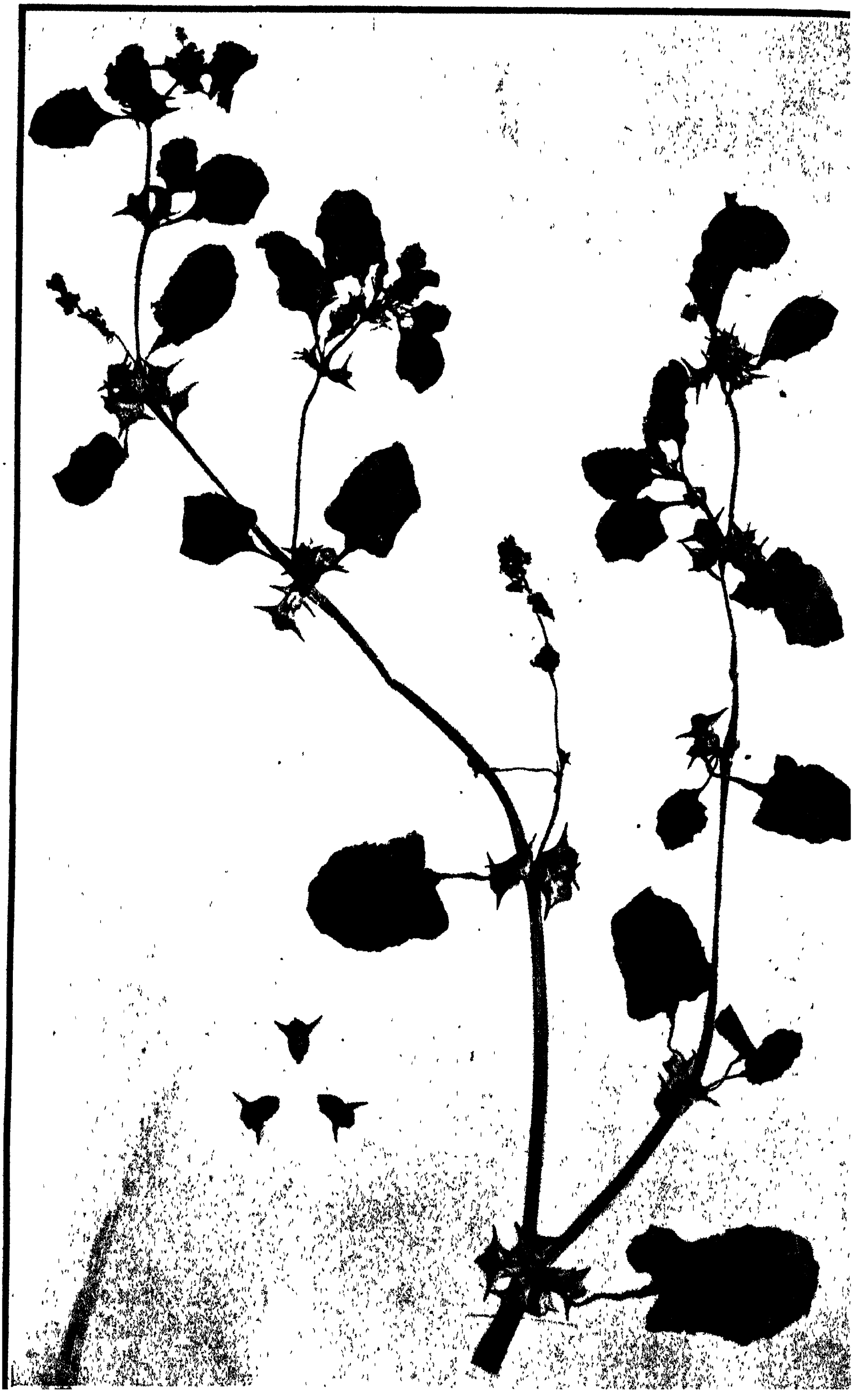


PLATE 41.—CAPE SPINACH. EMEX AUSTRALIS, Steinh.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RETURNS OF COWS FOR MONTH OF OCTOBER, 1916.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Bluebelle	Jersey	25 June, 1916	809	4·9	46·76	
Lilia	Ayrshire	4 Sept. ,,	998	3·9	45·67	
Lady Dorset	,,	14 ,, ,,	930	4·1	44·80	
Nina	Shorthorn	24 June ,,	1,004	3·8	44·74	
Sweet Meadows	Jersey	16 Aug. ,,	630	5·6	41·73	
Thornton's Fairetta	,,	26 May ,,	637	5·2	39·12	
Miss Bell	,,	1 Aug. ,,	595	5·5	38·69	
Queen Kate	Ayrshire	15 June ,,	916	3·5	37·51	
Rosine	,,	5 July ,,	778	3·9	35·60	
Mistress Bee	Jersey	21 Jan. ,,	493	5·8	33 84	
Auntie's Lass	Ayrshire	4 April ,,	710	4·0	33·34	
Dutch Maid	Holstein	22 Aug. ,,	824	3·4	32·75	
Lady Melba	,,	28 Oct., 1915	712	3·9	32·58	
Skylark	Ayrshire	21 Mar., 1916	693	3·9	31·70	
Princess Kate	,,	21 June ,,	683	3·9	31·24	
Lady Loch II.	,,	17 Mar. ,,	648	4·1	31·21	
Cocoatina	Jersey	17 Mar. ,,	544	4 8	30·79	
Iron Plate	,,	20 Jan. ,,	481	5·4	30 70	
Belinda	Ayrshire	27 Feb. ,,	629	3·9	28·78	
Netherton Belle	,,	23 April ,,	504	4·8	28·53	
Charity	Jersey	28 May ,,	474	5·0	27·96	
La Hurette Hope	,,	6 Oct. ,,	467	4·5	24·75	
Leonie	Ayrshire	16 Aug. ,,	529	3·6	22·81	
Windyhill Davidina	,,	16 July ,,	524	3·6	22·10	
LadyMitchell	Holstein	3 June ,,	469	4·0	22·08	
Lady Margaret	Ayrshire	14 Oct., 1915	393	4·6	21·29	

The above cows, in addition to natural pasture, were fed on sorghum and Soudan grass ensilage mixed with wheaten chaff.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RETURNS OF COWS FROM 1ST TO 26TH NOVEMBER, 1916.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Bluebelle	Jersey	25 June, 1916	667	4·9	38·54	
Jeannie	Ayrshire	27 Oct. ,,	725	4·1	34·92	
Lady Dorset	,,	14 Sept. ,,	762	3·9	34·87	
Nina	Shorthorn.	24 June ,,	776	3·8	34·56	
Thornton Fairetta	Jersey	26 May ,,	542	5·2	33·29	
Lilia	Ayrshire	4 Sept. ,,	727	3·8	32·39	
Sweet Meadows	Jersey	16 Aug. ,,	495	5·2	30·39	
Queen Kate	Ayrshire	15 June ,,	740	3·5	30·30	
La Hurette Hope	Jersey	6 Oct. ,,	505	5·0	29·80	
Lady Melba	Holstein	28 Oct., 1915	650	3·9	29·74	
Miss Bell	Jersey	1 Aug., 1916	487	5·0	28·73	
Twylish's Maid	,,	3 Nov. ,,	467	5·0	27·55	
Cocoatina	,,	17 March ,,	454	5·0	26·79	
Auntie's Lass	Ayrshire	4 April ,,	567	4·0	26·62	
Rosine	,,	5 July ,,	610	3·6	25·72	
Hedges Dutchmaid	Holstein	22 Aug. ,,	656	3·3	25·27	
Mistress Bee	Jersey	21 Jan. ,,	365	5·5	23·73	
Charity	,,	28 May ,,	379	5·3	23·73	
Skylark	Ayrshire	21 March ,,	546	3·7	23·66	
Princess Kate	,,	21 June ,,	550	3·6	23·20	
Lady Loch II.	,,	17 March ,,	500	3·9	22·89	
Belinda	,,	27 Feb. ,,	452	3·9	20·68	

The above cows, in addition to natural pasture, were fed on a ration of ensilage and mixed lucerne and wheaten chaff.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, NOVEMBER, 1916.

Eight thousand nine hundred and seventy-seven eggs were laid from 1st November to 27th November inclusive, an average of 123 per pen. There has been a falling off in the laying, owing largely to broodies, there having been as many as four of these out of one pen at the same time, and several pens have had three. The Dixie Egg Plant holds pride of place for the highest individual score, 196, closely followed by Miss Hinze with 195. It is unfortunate that one of the Dixie Plant birds has not laid an egg during the eight months, and there is every reason to believe that she is barren. Mr. Forrest had the misfortune to lose a hen (C) in September, and the replacing bird has not laid an egg : this hen also is possibly barren. Mr. Wilson wins the monthly prize with 144 eggs for the twenty-seven days. The following are the individual records :—

Competitors.	Breed.	Nov.	Total.
*J. Zahl	White Leghorns	133	1,035
*T. Fanning	Do.	122	1,031
*Miss M. Hinze	Do.	140	1,012
*A. T. Coomber	Do.	132	996
*J. M. Manson	Do.	141	994
G. H. Turner	Do.	137	982
A. Howe, N.S.W.	Do.	111	975
W. Meneely	Do.	137	960
J. R. Wilson	Do.	144	958
*Mrs. Jobling, N.S.W.	Black Orpingtons	107	955
Geo. Tomlinson	White Leghorns	133	941
Dr. E. C. Jennings	Do.	123	940
J. M. Manson	Black Orpingtons	128	917
*A. E. Walters	White Leghorns	128	915
*E. A. Smith	Do.	132	914
*E. F. Dennis	Do.	135	914
*Dixie Egg Plant	Do.	117	908
Mrs. Munro	Do.	130	896
Mrs. W. D. Bradburne, N.S.W.	Do.	137	894
T. B. Hawkins	Do.	112	890
Geo. Prince	Do.	129	887
T. Taylor	Do.	139	886
W. Lyell	Do.	122	886
A. W. Bailey	Do.	126	878
*J. F. Dalrymple, N.S.W.	Rhode Island Reds	111	877
Kelvin Poultry Farm	White Leghorns	124	869
H. W. Broad	Do.	128	869
T. E. Jarman, N.S.W.	Do.	125	866
*J. H. Gill, Victoria	Do.	132	856
*W. H. Knowles, junr.	Do.	137	854
*E. West	Do.	123	846
*C. Knoblauch	Do.	121	845
R. Burns	S.L. Wyandottes	118	845
Cowan Bros., N.S.W.	Black Orpingtons	116	843
P. Brodie	White Leghorns	135	843
H. Jobling, N.S.W.	Black Orpingtons	117	841
W. Purvis, S.A.	White Leghorns	132	836
F. Clayton, N.S.W.	Do.	127	834
A. F. Camkin, N.S.W.	Do.	119	833
*Kelvin Poultry Farm	Do.	121	832

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Nov.	Total.
Mars Poultry Farm	White Leghorns	129	830
Mrs. C. Davis	Do.	127	829
E. Pocock	Do.	136	828
A. H. Padman, S.A.	Do.	127	824
S. B. Tutin	Do.	89	823
*W. L. Forrest, N.S.W.	Do.	109	823
E. F. Dennis	Black Orpingtons	126	818
King and Watson, N.S.W.	White Leghorns	126	816
J. Anderson, Victoria	Do.	131	812
Cowan Bros., N.S.W.	Do.	142	811
T. Fanning	Black Orpingtons	130	803
C. P. Buchanan	White Leghorns	98	801
W. Becker	Do.	125	790
W. Hirst, N.S.W.	Do.	116	785
J. G. Richter	Do.	127	772
*J. H. Madrers, N.S.W.	Rhode Island Reds	106	769
F. Clayton, N.S.W.	Do.	120	766
R. Burns	Black Orpingtons	108	764
Mars Poultry Farm	Do.	131	758
C. W. Holland	White Leghorns	136	757
*J. W. Macrae	Black Orpingtons	95	755
J. Gosley	White Leghorns	97	746
*J. Anderson, Victoria	Red Sussex	88	743
W. H. Forsyth, N.S.W.	Black Orpingtons	103	704
J. F. Coates	White Leghorns	121	696
F. W. Leney	Do.	130	695
Moritz Bros., S.A.	Do.	142	687
H. Hammill, N.S.W.	Do.	129	680
L. K. Pettitt, N.S.W.	Do.	107	674
W. Lindus, N.S.W.	Do.	128	668
A. T. Coomber	Sicilian Buttercups	112	634
F. W. Leney	Rhode Island Reds	110	606
E. F. Dennis	White Wyandottes	95	561
Totals	...	8,977	60,981

* Indicates that the pen is taking part in single hen competition.

SINGLE HEN TEST RESULTS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
J. Zahl	161	173	185	167	174	175	1,035
T. Fanning	180	182	183	176	161	149	1,031
Miss M. Hinze	172	155	195	156	173	161	1,012
A. T. Coomber	171	180	175	144	152	174	996
J. M. Manson	153	190	155	157	183	156	994
Mrs. J. Jobling	178	192	136	159	133	157	955
A. E. Walters	159	181	147	133	167	128	915
E. A. Smith	180	160	148	171	125	130	914
E. F. Dennis	139	178	129	173	159	136	914
Dixie Egg Plant	196	181	187	174	...	170	908
J. F. Dalrymple	136	137	169	116	167	152	877
J. H. Gill	117	146	135	173	148	137	856
W. H. Knowles, junr.	140	135	147	123	159	150	854
E. West	176	158	124	128	120	140	846
C. Knoblauch	132	150	134	128	150	151	845
Kelvin Poultry Farm	130	132	144	116	175	135	832
W. L. Forrest	154	156	52	165	159	137	823
J. H. Madrers	100	149	153	141	120	106	768
J. W. Macrae	96	162	144	129	106	118	755
J. Anderson	143	115	155	68	154	108	743

General Notes.

GINSENG.

By an oversight the illustrations of the Ginseng root and plant were omitted from our article on this plant in the November issue of the Journal. They are interesting as showing the singular forms taken by the roots.

SOCIETIES, ETC.

Binjour Plateau—Binjour Dairymen and Farmer's Society; H. F. Lindenmayer, secretary.

Brisbane—

The Jersey Cattle Society of Queensland; R. S. Maynard, secretary.

The Holstein Cattle Club of Australia; R. S. Maynard, secretary.

The Ayrshire Cattle Society of Queensland; R. S. Maynard, secretary.

The Illawarra Dairy Cattle Association of Queensland; R. S. Maynard, secretary.

The Milking Shorthorn Stud Society of Queensland; R. S. Maynard, secretary.

The Shorthorn Stud Book Society of Queensland; R. S. Maynard, secretary.

The Queensland Dairy Stud Book Society (Alfred Gorrie, secretary) is deleted from the quarterly list of Societies and Associations, formerly published monthly in the " Queensland Agricutural Journal."

Wamuran.—Wamuran District Fruitgrowers' and Progress Association; Ray. E. Whiting, secretary.

Yandina Creek Farmers and Settlers' Progress Association; Secy., J. J. Simpson.

Yandina Creek Farmers and Settlers' Progress Association; J. J. Simpson, secretary.

BUDERIM MOUNTAIN BRANCH OF THE QUEENSLAND FARMERS' UNION.

Mr. Arthur Blakey has been appointed secretary to the Buderim Mountain Branch, *vice* Captain G. Burrows, resigned.

POTATO BLIGHT.

The Department of Agriculture and Stock has of late received many inquiries from farmers as to the best method of dealing with the Irish Blight in potatoes, and recommends the systematic spraying of all potatoes with either the Bordeaux or the Burgundy mixtures.

The former is made by dissolving 6 lb. of bluestone in 20 gallons of water in one tub, and slacking 4 lb. of quicklime in another tub, and adding sufficient water to make 20 gallons of milk of lime. The two are then mixed together in a third wooden tub, the result being 40 gallons of Bordeaux mixture.

Burgundy mixture is made by dissolving 8 lb. bluestone in 35 gallons water in a wooden tub, and 10 lb. of washing soda in 5 gallons water in a second vessel. The washing soda solution is then poured slowly into the bluestone solution and stirred, the result being 40 gallons of Burgundy mixture.

SCARCITY OF POTASH.

Mr. J. C. Brünnich, Agricultural Chemist, in answer to many inquiries as to the potash content of certain trees, small plants, and shrubs, supplies the following analytical figures showing the weights of lime, potash, and phosphoric acid contained in the ashes of such trees and plants, in pounds and fractions of a pound:—

Ash.	Lime.	Potash.	Phosphoric Acid.
Bloodwood	8·47	5·25	·27
Ironbark	(?)	1·53	·82
Blackbutt	7·27	2·02	·04
Red gum	(?)	4·17	·38
Spotted gum	(?)	·70	·10
Boxwood	(?)	1·85	·87
Belar	49.10	4.95	.02
Gidyea	48·70	1·10	·90
Brigalow	54·40	·89	(?)
Apple-tree	29·85	4·45	·34
Pineapple plants	7·20	15·02	5·88
Bottle-tree	23·48	29·02	·24
Banana plants	21·32	38·84	1·46
Sisal hemp	31·86	8·00	4·60
Cane tops	4·78	6·49	4·90
Cane trash	4·00	4·90	3·20
Lantana	16·95	13·96	3·57

DEALING WITH THE ANT PEST.

The Beerwah correspondent of the "Farmers' Gazette" writes—

"Here is an absolute and simple preventive against the incursion of ants into safes and cupboards which is guaranteed to give immunity from ant plague, and has never been known to fail:—Take a strip of ordinary tape, say, an inch wide, and, after smearing with castor oil, tie neatly around the legs of safes, tables, &c., where ants are troublesome, and no ant will ever be seen to cross the tape, which must be placed 2 or 3 in. from the floor, and the oil renewed occasionally, say every month or even at longer intervals of two or three months, care being taken to prevent the tape becoming coated with dust. Ordinary prepared or crude castor oil is all that is needed. No other kind of oil must be applied to the tapes."

Answers to Correspondents.

H. J. PAGE, Lake Cootharaba—

Mr. C. Ross, Instructor in Fruit Culture, supplies the following answers to your questions:—

1. Three or four male papaw trees would be quite sufficient for fifty female trees. As the papaw is not strictly diœcious, male trees are not absolutely necessary.
2. By Finger Cherries, if you mean the fruit of the Eugenia, I have never heard of it being injurious to the eyesight when eaten.
3. The Brazilian or Surinam Cherry has no similarity to a finger. It is not an elongated fruit, but more in the shape of a rosette. We eat them in our house, cooked and uncooked, in large quantities, and never suffered any ill effects from them.
4. With reference to the diseased fruit you mention, send one to the Departmental Pathologist (Mr. H. Tryon) for diagnosis.

Statistics,

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF OCTOBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING OCTOBER, 1916 AND 1915, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Oct.	No. of Years' Records.	Oct., 1916.	Oct., 1915.
North Coast.	In.		In.	In.
Atherton	0·76	15	0·47	0·25
Cairns	1·78	34	7·13	0·17
Cardwell	1·87	44	2·18	0·78
Cooktown	1·13	40	2·94	1·35
Herberton	0·94	29	0·84	0·19
Ingham	1·56	24	1·15	3·35
Innisfail	2·74	35	14·14	2·01
Mossman	5·05	1	10·29	1·51
Townsville	1·23	45	2·57	0·15
Central Coast.				
Ayr	0·94	29	1·16	3·46
Bowen	1·09	45	1·21	2·02
Charters Towers	0·70	34	0·42	0·03
Mackay	1·99	45	4·04	0·99
Proserpine	1·65	13	5·94	1·95
St. Lawrence	1·79	45	6·15	2·08
South Coast.				
Biggenden	2·20	17	6·12	2·40
Bundaberg	2·08	33	5·81	0·80
Brisbane	2·72	65	3·30	0·25
Childers	2·08	21	6·10	0·27
Crohamhurst	3·74	22	6·04	0·21
Esk	2·42	29	3·06	0·50
Gayndah	2·38	45	6·71	0·11
Gympie	2·76	46	5·59	0·16
Glasshouse M'tains	3·00	8	5·67	0·20
Kilkivan	2·78	37	4·23	0·45
Maryborough	2·74	45	5·70	0·11
South Coast—continued:	In.		In.	In.
Nambour	3·11	20	7·82	0·59
Nanango	2·33	34	5·87	0·83
Rockhampton	1·80	29	4·09	1·72
Woodford	2·69	29	5·34	0·21
Darling Downs.				
Dalby	2·14	46	3·57	0·38
Emu Vale	2·45	20	2·45	0·03
Jimbour	1·89	28	3·54	0·91
Miles	2·03	31	2·19	0·42
Stanthorpe	2·66	43	3·36	0·33
Toowoomba	2·68	44	4·11	0·26
Warwick	2·35	29	2·15	0·02
Maranoa.				
Roma	1·76	42	2·04	0·16
State Farms, &c.				
Bungeworgorai	1·07	4	1·90	0·16
Gatton College	2·46	17	2·93	0·05
Gindie	1·36	17	2·39	0·83
Hermitage	2·06	10	1·92	0·20
Kairi	1·38	4	1·32	Nil
Kamerunga	1·59	27	4·99	0·25
Sugar Experiment Station, Mackay	1·69	19		1·61
Warren	..	.		3·09

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for October this year and for the same period of 1915, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
Divisional Officer.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET AT BRISBANE AND THE PHASES OF THE MOON FOR THE THIRD FOUR MONTHS OF 1916.

Date.	SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets
1	6·3	5·33	5·29	5·47	4·59	6·5	4·46	6·28
2	6·2	5·33	5·28	5·48	4·58	6·6	4·46	6·29
3	6·1	5·34	5·27	5·48	4·57	6·7	4·46	6·29
4	6·0	5·34	5·26	5·49	4·56	6·8	4·46	6·30
5	5·59	5·35	5 25	5·49	4·55	6 8	4·46	6·31
6	5·58	5·36	5·24	5·50	4·55	6·9	4·46	6·31
7	5·57	5·36	5·23	5·50	4·54	6·10	4·46	6·32
8	5·56	5·37	5·22	5·51	4·54	6·10	4·46	6·33
9	5·55	5·37	5·20	5·51	4·53	6 11	4·47	6 34
10	5·54	5·38	5·19	5·52	4·52	6·11	4·47	6·34
11	5·53	5·38	5·18	5·52	4·52	6·12	4·47	6·35
12	5·52	5·39	5·17	5·53	4·51	6 12	4·47	6·36
13	5·51	5·39	5·16	5·53	4 51	6·13	4·47	6·36
14	5·50	5·40	5·15	5·54	4·50	6·13	4·48	6·37
15	5·48	5·40	5·14	5·54	4·50	6·14	4·48	6·38
16	5·47	5·41	5·13	5·55	4·50	6·15	4·48	6·38
17	5·46	5·41	5·12	5·56	4·49	6·16	4·49	6·39
18	5·45	5·41	5·11	5·56	4·49	6·17	4·49	6·40
19	5·43	5·42	5·10	5·57	4·48	6·18	4·49	6·40
20	5·42	5·42	5·9	5·57	4·48	6·19	4·50	6·41
21	5·41	5·43	5·8	5·58	4·47	6·20	4·50	6·41
22	5·40	5·43	5·7	5·58	4·47	6 21	4·51	6·42
23	5·38	5·44	5·6	5·59	4·47	6·22	4·51	6·42
24	5·37	5·44	5·5	5·59	4·47	6·23	4·52	6·43
25	5·36	5·44	5·5	6·0	4·47	6·23	4·52	6·43
26	5·35	5·45	5·4	6·1	4·46	6·24	4·53	6·44
27	5·34	5·45	5·3	6·1	4·46	6·25	4·53	6·44
28	5·33	5·46	5·2	6·2	4·46	6·25	4·54	6·45
29	5·32	5·46	5·1	6·3	4·16	6·26	4·55	6·45
30	5·30	5·47	5·0	6·3	4·46	6·27	4·55	6.46
31	...	...	5·0	6·4	...	...	4·56	6·46

The Phases of the Moon commence at the times stated below in Queensland, New South Wales, Victoria, and Tasmania.

		H.	M.	
5 Sept.	☾ First Quarter	2	26	p.m.
12 „	○ Full Moon	6	31	a.m.
19 „	☽ Last Quarter	3	35	p.m.
27 „	● New Moon	5	34	„

The moon will be nearest the earth on the 9th at 11·24 p.m., and farthest from the earth on the 21st at 7·36 p.m.

4 Oct.	☾ First Quarter	9	0	p.m.
11 „	○ Full Moon	5	1	„
19 „	☽ Last Quarter	11	8	a.m.
27 „	● New Moon	6	37	„

The moon will be nearest the earth on the 7th at 8·30 a.m., and on the 19th, at 3·12 p.m., at its farthest distance.

3 Nov.	☾ First Quarter	3	50	a.m.
10 „	○ Full Moon	6	18	„
18 „	☽ Last Quarter	8	0	„
25 „	● New Moon	6	50	p.m.

The moon will be nearest the earth on the 1st at 4·48 a.m., and on the 28th at 5·42 a.m.; it will be farthest from the earth on the 16th at noon.

2 Dec.	☾ First Quarter	11	55	a.m.
9 „	○ Full Moon	10	44	p.m.
18 „	☽ Last Quarter	4	6	a.m.
25 „	● New Moon	6	31	„
31 „	☾ First Quarter	10	7	p m.

The moon will be farthest from the earth on the 14th at 6·48 a.m., and nearest on the 26th at 10·30 a.m.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise and sunset are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during September, October, November, and December may be roughly arrived at by adding 16 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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